

GOLD WAR BOMBERS

The world's deadliest aircraft

EAST VERSUS WEST

Bear • Blinder • Backfire



V-bombers • **B-52** • **Hustler**



EXCLUSIVE PROFILES AND RARE PHOTOGRAPHS

AEROPLANE SPECIAL

ATION ARCHIVE



Your favourite magazine is also available digitally.

DOWNLOAD THE APP NOW FOR FREE.



FREE APP

In app issue £6.99 2 Months £5.99 Annual £29.99

SEARCH: Aviation Archive

Read on your







iPhone & iPad Android PC & Mac Blackberry









SEARCH AEROPLANE

FREE APP IN APP ISSUES £3.99

How it Works.

Simply download the Aviation Archive app. Once you have the app, you will be able to download new or back issues for less than newsstand price!

Don't forget to register for your Pocketmags account. This will protect your purchase in the event of a damaged or lost device. It will also allow you to view your purchases on multiple platforms.













Available on PC, Mac, Blackberry, Windows 10 and kindle fire from pocketmags.com



Cold War Bombers



the Cold War'. Three words that still have the power to chill the blood. After the devastation of World War 2, the world entered a terrifying age of political and military tension between East and West. Each side had a nuclear deterrent that prevented an attack by the other, on the basis that such an act would lead to total annihilation: the doctrine of mutually assured destruction (MAD). But there was no point in having a deterrent if you did not have the means to deliver it. Enter the age of the nuclear bomber, the age when B-52s, Hustlers, Vulcans, Victors, 'Bears' and 'Badgers' ruled the skies.

'Keepers of the peace' or 'destroyers of the world'? No matter how you view these mighty beasts, there was no denying that they were technological masterpieces, the ultimate war machines of their time. As the superpowers 'fought' for supremacy, it was the bombers that were at the sharp end of the technological battle, flying ever faster, further and higher. Thankfully these 'Gods of War' were never called upon to unleash

their destructive abilities to the full, but their awesome power and futuristic design resulted in some of the most iconic flying machines the world has ever seen.

The reign of the nuclear bomber was not to last, its mission superseded by the development of less vulnerable ballistic missiles, but its legacy lives on today...

AVIATION ARCHIVE SERIES

'Cold War Bombers' is No 28 in the Aviation Archive series. Subject aircraft are listed chronologically from the dates of their maiden flights and are filed under nation of manufacture. The extensive photographic coverage includes many exclusive and rare shots that have never been published before. As ever, the words and photographs are complemented by 'period' cutaways from the talented pens of the 'Flight' and 'Aeroplane' artists of the era, together with specially-commissioned aircraft profiles.

Aviation Archive Series

Cold War Bombers: The world's deadliest aircraft

- Author: Denis J. Calvert Editor: Allan Burney Design: Key Studio
- Publisher and Managing Director: Adrian Cox Executive Chairman: Richard Cox Commercial Director: Ann Saundry Group Editor: Nigel Price
- $\bullet \ \, \textbf{Distribution:} \ \, \text{Seymour Distribution Ltd} \ \, + 44\,(0) 20\,7429\,4000 \, \bullet \, \textbf{Printing:} \ \, \text{Warners} \ \, (\text{Midlands}) \ \, \text{PLC, The Maltings, Manor Lane, Bourne, Lines PE10 9PH.} \ \, \text{The Maltings} \ \, \text{Manor Lane, Bourne, Lines PE10 PPH.} \ \, \text{Manor Lane, Lines PE10 PPH.} \ \, \text{Manor Lane, Lines P$

All rights reserved. The entire content of Aviation Archive is © Key Publishing 2016. Reproduction in whole or in part and in any form whatsoever is strictly prohibited without the prior permission of the Publisher. We are unable to guarantee the bona fides of any of our advertisers. Readers are strongly recommended to take their own precautions before parting with any information or item of value, including, but not limited to, money, manuscripts, photographs or personal information ir response to any advertisements within this publication. Published by Key Publishing Ltd, PO Box 100, Stamford, Lincs PE19 1XQ. Tel: +44 (0) 1780 755131. Fax: +44 (0) 1780 757261. Website: www.keypublishing.com ISBN: 9781910415726



Cold War Bombers The world's deadliest aircraft

FRANCE

MIRAGE IV

France's 'pocket bomber' that could pack a powerful punch



TUPOLEV TU-4'BULL'

The Soviet's first nuclear bomber

ILYUSHIN IL-28 'BEAGLE' 9

The Cold War's most numerous bomber type

10 TUPOLEV TU-16 'BADGER'

A sleek and versatile strategic bomber

14 **TUPOLEV TU-95 'BEAR'**

An iconic Soviet heavyweight

MYASISHCHEV M-4'BISON' 21

The Soviet's answer to the B-52

24 TUPOLEV TU-22 'BLINDER'

Futuristic looks but ultimately a failure

TUPOLEV TU-22M 'BACKFIRE'

The bomber that struck fear in the West

30 **TUPOLEV TU-160 'BLACKJACK'**

A B-1B Lancer on steroids

UNITED KINGDOM

VICKERS VALIANT

The first of the V-bomber triumvirate

41 **AVRO VULCAN**

The UK's most famous bomber of the Cold War

48 HANDLEY PAGE VICTOR

The most advanced of the V-bombers

ENGLISH ELECTRIC CANBERRA

Mainstay of the UK's light bomber force given a nuclear capability

56 **BLACKBURN BUCCANEER**

The master of low-level attack

UNITED STATES

BOEING B-29 SUPERFORTRESS

The only bomber ever to have dropped a nuclear weapon in anger

61 **BOEING B-36 PEACEMAKER**

Not much peace from this 10-engined monster

NORTH AMERICAN B-45 TORNADO

America's first jet bomber

BOEING B-50 SUPERFORTRESS

A beefed up B-29

70 BOEING B-47 STRATOJET

Radical, sleek and fast

BOEING B-52 STRATOFORTRESS

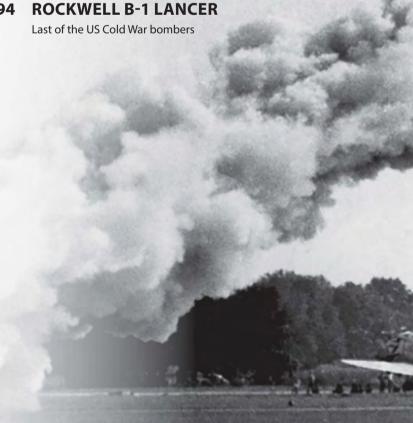
The aircraft that has defied time

CONVAIR B-58 HUSTLER

The first Mach 2 bomber

92 GENERAL DYNAMICS FB-111

The swing-winger given a nuclear role





Dassault Mirage IV



n the aftermath of World War 2, France had an ambivalent attitude towards its membership of NATO. While it undoubtedly needed the degree of mutual support and protection that NATO offered, there was a deep-seated distrust of relying upon a foreign power to provide its ultimate, nuclear security. The country's defence plan for 1955-59 provided for the development of a French nuclear weapon, its packaging into a small air-droppable form and the construction of a bomber to provide the delivery method.

Dassault Aviation, already having considerable success with its single-engined Mirage III series of fighters, proposed a twinengined (SNECMA Atar) variant scaled up by 50% in each dimension, this resulting in an aircraft with more than twice the all-up weight. Thus was born the Mirage IV, which would become the spearhead of France's 'Force de Frappe' (strike force) and a source of great national pride (a true Gallic symbol) over several decades. As with pretty much everything

else in the Mirage IV programme, the nuclear weapon carried – either the early AN-11 or the later AN-22 – was wholly French-designed and produced. Unlike the independent nuclear deterrent of several countries, the French strike force was exactly that – independent.

The first prototype Mirage IV got airborne from Melun Villaroche on 17 June 1959, piloted by Roland Glavany. The following day, on its second flight, the aircraft made a single pass at the le Bourget Salon, flying at 300ft and 350kts for maximum effect.

There were three pre-series Mirage IVA, to be followed by a production batch of 50, the first of which flew on 7 December 1963. The Mirage IVA was not a large aircraft and the fact that its combat radius did not exceed 1,000 miles limited the targets (in the Soviet Union) that could be reached. It did not have a bomb bay as such; rather, the single weapon was carried, semi-recessed into the centre fuselage. The pilots of France's FAS (Forces Aériennes Stratégiques) came to accept that, in delivering the single free-fall AN-22 nuclear

Dassault Mirage IVA

Crew: 2

Armament:

 Length:
 76ft 6in (23.32m)

 Wingspan:
 38ft 10in (11.84m)

 Height:
 17ft 9in (5.42m)

 Weight empty:
 31,990lb (14,510kg)

 Max. T/O weight:
 70,550lb (32,000kg)

Max Speed: Mach 2.2 (1,450mph)

at altitude

Range: 2,500 miles (4,000km)

Powerplant: 2 x SNECMA ATAR 9K turbojets rated at

10,380lb (4,710kg) dry and 14,770lb (6,700kg)

in afterburner AN-11, AN-22 free-fall

nuclear weapons



Left: The Mirage IV might not have been large by bomber standards, but take-offs were always a spectacular and noisy affair, especially when it was fitted with 12 JATO (jet-assisted take-off) bottles to help it operate out of relatively short strips. The 'P' variant pictured here could carry a pair of ASMP (Air-Sol Moyenne Portée) missiles.

Right: The sharp end (literally) of the first
Mirage IV, very much a product of the Dassault
bureau. The 'makeshift' bomber was effectively a
twin-engined scaled-up version of the Mirage III.

weapon into Eastern Europe, their mission was probably one-way. The agreement by the US government to authorise the sale of 12 KC-135 (C-135F – 'F' for 'France') flight refuelling tankers greatly improved the force's effectiveness and its targeting options. The first of these flew in February 1964, and 11 of the original 12 remain in service today.

As designed, the Mirage IVA was intended for a high-high flight profile at Mach 1.8 to deliver its single nuclear store, but the increasing threat posed by Soviet surface-to-air missiles in the 1960s forced a rethink. Twelve further Mirage IVA were ordered in 1964, these incorporating structural and flight control changes to suit them for the low-level role that would become increasingly important. In time, these same

changes were incorporated in all

remaining aircraft of the first batch.
At its peak, the FAS had nine
escadrons (squadrons) of
Mirage IV, each with



four aircraft, along with its 12 C-135F tankers. The need to disperse the force to guard against a possible pre-emptive strike saw each squadron based at a different airfield.

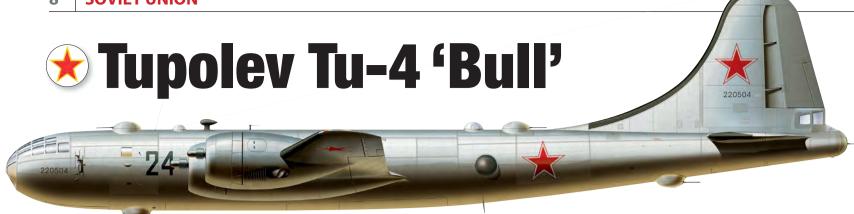
A nuclear ground alert was held from 5 October 1964. Mont-de-Marsan was selected as the first base, but the alert was gradually extended to the Mirage IV squadrons on other bases. Alert states varied from a relatively relaxed 15 minutes (ie 15 minutes from launch signal to take-off) to 5 minutes and, in extremis, to an alert state with the crews ready in cockpit. Unlike SAC, FAS did not have the resources to mount an airborne alert, although there is a persistent story doing the rounds that a Mirage IVA complete with AN-11 nuclear weapon on ground alert was launched in error in 1965 as the result of problems of communication and authorisation.

The Mirage IV force was alone in holding the French nuclear alert until the early 1970s, when two further 'legs' of what would become France's nuclear triad became operational.

Eighteen silo-launched ballistic missiles were declared operational on the Plateau d'Albion in the south of the country in August 1971, while the country's first ballistic missile-armed submarine 'le Redoutable' was commissioned on 1 December of the same year. Both these offered a more capable and less vulnerable delivery system than the Mirage IV with a free-fall bomb, and the front-line strength of Mirage IVs was progressively reduced.

To keep the Mirage IV fleet viable in the context of a possible central European war, the decision was taken in October 1979 to rebuild 18 Mirage IVA to a new IVP ('P' for 'penetration' – the same in English as in French) standard. The main change was the ability to carry a pair of ASMP (Air-Sol Moyenne Portée) missiles to provide a decent stand-off range. The first IVP flew on 12 October 1982 and gave the Mirage IV a new lease of life, the type only finally being retired in 2005, although its final years were in the reconnaissance role fitted with the CT52 recce pod.

Below: For many years the Mirage IV was a vital part of the nuclear triad of the 'Force de Frappe', France's nuclear deterrent striking force. It did not have a bomb bay as such; rather, the single weapon was carried, semi-recessed into the centre fuselage. The Mirage IV was retired from the nuclear strike role in 1996, and the type was entirely retired from operational service in 2005.



hen three USAAF B-29s landed by chance in the east of the Soviet Union in 1944, they were given to Soviet engineers who examined them in great detail. The result was a reverse-engineered B-29, in almost every respect a copy of the Boeing-built original, but with little or no parts commonality.

Given the designation Tu-4 to reflect Tupolev's management of the project, the new 'Russian' aircraft was put into priority production, the first example flying on 19 May 1947. From both a design and production point of view, the Soviet aircraft industry learnt a lot from this exercise.

The Tu-4 gave the Soviets a state-of-theart strategic bomber much sooner than would otherwise have been possible. Some 850 examples were produced and the type remained in the bomber role into the early 1960s. A Tu-4 dropped the first Soviet nuclear weapon, the RDS-1, in 1949 and for a number of years provided the Soviet Air Force's only strategic nuclear delivery system. Above: Tupolev Tu-4 'Bull', bort 24 black, c/n 220504, built in Kazan plant No 22, and based at Bagerovo AB near Kerch, Ukraine, late 1950s. Artwork © Zaur Eylanbekov

Below: The B-29 ancestry of the Tu-4 'Bull' is all too apparent. The aircraft were in fact reverse-engineered with differences being limited to the engines, the defensive weapons, the radio and the identification friend or foe (IFF) system. The Soviet engine, the Shvetsov ASh-73 was a development of the Wright R-1820 but was not otherwise related to the B-29's Wright R-3350. Foxbat Files Image Library



🖈 llyushin II-28 'Beagle'

ccupying very much the same place in the Soviet Air Force as did the Canberra in the RAF and the B-45 in the USAF, the II-28 was a twin-jet light attack bomber with a tactical nuclear capability. Built to a total of 6,316 examples, this was the Cold War's most numerous bomber type.

The II-28's origins date to late 1947, when Sergey Ilyushin proposed a relatively conservative design, straight-winged (but with a swept tailplane and fin) and powered by two Rolls-Royce Nene centrifugal turbojets. Soviet access to the latest jet engine technology was the result of an ill-judged decision by the post-war British government to present 25 Rolls-Royce Nene turbojets to the country 'for research purposes'. Breaking both the letter and the spirit of these undertakings, the Soviets reverse engineered the Nene to produce their own RD-45. The prototype II-28, which flew on 8 July 1948 from the test centre at Zhukovsky, had two original Nenes; later examples would be fitted with unlicensed-copy RD-45s. In the best Soviet traditions, the II-28 was a rugged aircraft, capable of operation from rough strips and with the ability to fit two JATO bottles further to improve take-off performance. Handling was assessed as good; the pilot could easily trim out the aircraft in the case of an engine failure and the prototype reached a



the RD-45, were able to



Above: The II-28 design was conventional in layout, with high, unswept wings and a swept horizontal tail and fin. The engines were carried in bulky engine nacelles slung directly under the wings.

The II-28 made its first public appearance at the May Day parade in Moscow in 1950. It was promptly allocated the NATO reporting name of Beagle. By this time, the type was in production at three separate factories and large numbers were soon coming off the production lines. As Soviet units started re-equipment with the II-28, priority was given to those in the west which were closest to the NATO borders. The aircraft was radar-equipped and had a decent avionics fit. Once crews had worked up to combat ready status and had been issued with the RDS-4 nuclear weapon, the increasing number

regiments of II-28s constituted a viable, near allweather tactical nuclear force. As such, it caused NATO serious worries in the European theatre.

The II-28 was produced in numerous variants in the Soviet Union, Czechoslovakia and China and went on to serve with some 20 friendly (to the Soviet Union, that is) countries. II-28s took part in the Korean War, while a batch of nuclear-capable II-28N was deployed to Cuba in September 1962, arriving by sea alongside the Soviet ballistic missiles. In central Europe, however, the type was obsolescent by 1960 and mass withdrawals followed. Many Il-28s remained in service in second-line roles and the Romanian Air Force operated its last example (a Chinese-built H-5) until written off in a crash in 2001.



Above: An unarmed training version of the Il-28 was fitted with a new nose housing a cockpit for the instructor, while the trainee sat in the normal cockpit. Designated II-28U, the variant was given the NATO reporting name 'Mascot', one of its operators being Egypt, as illustrated. Egypt received 70 Czechoslovakian-built II-28s in 1956, shortly before the Suez Crisis. The Israelis rated the II-28 as a high priority target during the Six-Day War.



★ Tupolev Tu-16 'Badger'

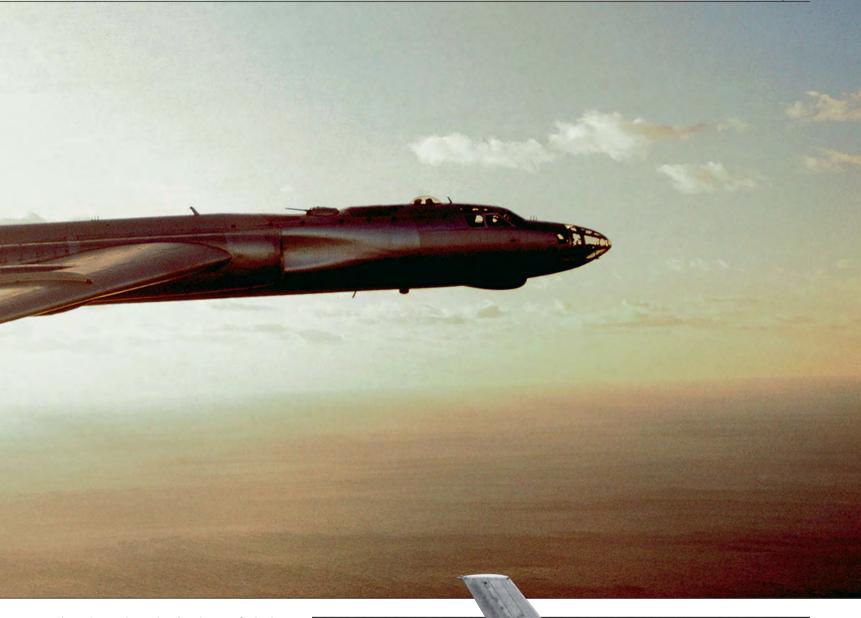
upolev's Tu-16 was a twin-jet bomber from the early 1950s, born of the need to produce an aircraft capable of delivering Soviet weapons of the time over a long distance at speeds much greater than those of the Tu-4. The weapon around which the design was based was the high-explosive FAB-9000, which was a 9000kg/20,000lb weapon, this dictating the size of the bomb bay.

Tupolev's design featured a highly swept wing (with a 41-degree sweep on the inboard leading edge), two Mikulin AM-3 axial flow turbojets in the wing root and a novel undercarriage arrangement that would become a trademark of the Tupolev design bureau. This featured a tricycle arrangement in which the main gear retracted rearwards into streamlined

pods that projected beyond the trailing edge of the wing. To place the aircraft in context, the Tu-16 was to the Soviet Air Forces what the Valiant was to the RAF or the B-47 to SAC – a first-generation medium bomber that would prove adaptable to many other roles.

The first prototype was designated Tu-88 and flew on 27 April 1952. Performance, though, was disappointing as weight growth had eroded range and weapons load. A disciplined effort to produce a lighter aircraft gave rise to the Tu-16A, the production version that was the basis of the many variants that would be produced, either as new-build or by conversion. This was dubbed 'Badger-A' by NATO. Full-scale production was authorised in 1953 and nine aircraft overflew Red Square in Moscow on 1 May 1954.

Over 1,500 Tu-16s of all variants would be built before construction ended in the early 1960s. 'Badger-A' was primarily employed to deliver the Soviet nuclear arsenal, a task it carried out admirably until the widespread deployment of SAMs made penetrating western air defences more dangerous and ICBMs seemed to offer better deterrence at less cost. As a result, Tu-16s were increasingly converted to take on other roles. Variants included aircraft for air-to-air refuelling using the probe and drogue or the 'wingtip to wingtip' method, specialised anti-shipping with ASMs including the AS-1 Kennel, maritime reconnaissance, ELINT and electronic jamming. These were designated 'Badger-A' through 'Badger-L'. The Tupolev Tu-104, the first Soviet jet airliner, was based on the Tu-16 and a



Above: A rare air-to-air colour image of a Soviet Tu-16 'Badger' pictured against a setting sun. Foxbat Files Image Library

Right: Underside view of a Soviet 'Badger-C' equipped with a Raduga KSR-5 missile under the wing. Given the NATO reporting name AS-6 'Kingfish', this long-range, air-launched cruise missile and anti ship missile was essentially a scaled down version of the Raduga Kh-22 'Kitchen', built specificallyfor the Tu-16. Photo courtesy of Joint Services Recognition Journal via FoxbatFiles.com

number of de-militarised Tu-16G/'Badger-A' were issued to Aeroflot for crew training and mail services prior to the Tu-104 entering airline

service in 1956.

China set up a production line, this time with permission, under a Sino-Soviet accord signed in 1957. Chinese aircraft were based on the 'Badger-A' and were known as the Xian H-6. Most served in the bomber or anti-shipping roles, with more than 100 believed still to be in service.





Tupolev Tu-16 'Badger-A'

Crew: 6

 Length:
 114ft 2in (34.8m)

 Wingspan:
 108ft 3in (33.0m)

 Height:
 34ft (10.4m)

 Weight empty:
 83,500lb (37,900kg)

 Max. T/O weight:
 160,000lb (72,600kg)

 Max Speed:
 650mph (1,050km/h)

Range: 4,500 miles (7,250km) **Powerplant:** 2 x Mikulin AM-3

turbojets rated at

19,300lb

Armament: (defensive) 6 x AM-23

cannon in three positions. (offensive) conventional HE bombs up to the 20,000lb FAB-9000, nuclear weapons as available Top left: A versatile design, the Tu-16 was built in numerous specialised variants for reconnaissance, maritime surveillance (seen here in 1989), electronic intelligence gathering (ELINT), and electronic warfare (ECM).

Above: A further development, the Tu-16K-10-26, carried a single K-10S and two KSR-2 or KSR-5 AS-6 'Kingfish' missiles. Some were later converted into ELINT platforms, as illustrated.

Below: This Tupolev Tu-16, Bort 50 (1880302), was essentially a standard bomber version, which throughout its career served as a prototype for other versions. The airframe currently resides in Monino. Foxbat Files artwork by Andrey Zhirnov







* Tupolev Tu-95 'Bear'

ome aircraft prove impossible to replace. For the RAF it was the Canberra, and for the USAF the B-52. For the Soviets, it has surely been Tupolev's Tu-95, NATO codename 'Bear', whose origins can be traced back to 1951, but which remains in widespread front-line service to this day.

Tupolev's early choice of swept wings (35 degrees), swept tailplane and four turboprop engines for its big bomber might seem a strange one, but the need was for extreme range and the fuel economy of then-current jet engines simply did not meet the requirement. With its four Kuznetsov NK-12 engines, each

giving 12,000ehp for take-off and driving contra-rotating propellers (2 x 4 blades per engine), the Tu-95 looks – and sounds – unique. Your author remembers, when he was but a lad, reading the entry in a recognition journal for the Tu-95. Under 'distinguishing features' it stated simply 'The Bear is like no other aircraft'.



The first prototype flew from Zhukovsky on 12 November 1952 in conditions of unprecedented (even for the Soviet Union) secrecy. Flight testing continued but not without incident. On the 16th flight the gearbox on one engine failed totally and it was only the skill of pilot Aleksey Perelyot that ensured the aircraft was landed safely, such that the cause of the failure could be investigated. Just months later, Perelyot was not so lucky. On 11 May 1953 an engine fire developed leading to the No 3 engine parting

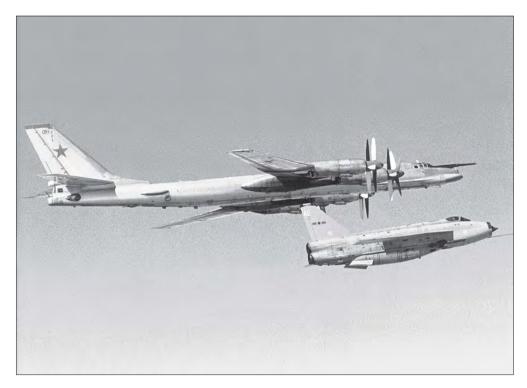
with the aircraft and a general fire developing. Perelyot died in an unsuccessful attempt to crash land. For this he was awarded Hero of the Soviet Union, while the senior engineer at the plant was charged with responsibility for the failings that led to the crash and was sentenced to death by a court martial (although

Below: The 'baddest' Bear of them all, the
Tu-95MS carries a powerful punch of up to 16
cruise-missiles, including six Kh-55, Kh-55SM
or Kh-555s on a rotary launcher in the weapons
bay. Foxbat Files photo by Dmitriy Pichugin

a subsequent act of 'clemency' saved him from execution). Despite these mishaps, the type was ordered into production and the first aircraft off the line flew late in 1955.

Despite the apparent handicap of its not being pure jet-powered, the Tu-95 has a cruise speed of around 460mph and is credited with a combat radius of over 6,000 miles. The choice of a swept wing means that the main spar need not pass through the bomb bay which, as a result, is suitably vast and capable of carrying a variety of suspension units for





different weapons and roles. The Tu-95 has proved supremely adaptable. Early versions (Tu-95 'no suffix' and Tu-95M 'Bear-A') served as strategic bombers, armed with free-fall nuclear weapons, but not equipped with a flight refuelling probe. It appears, though, that the Soviet Air Force never mounted airborne alerts with 'Bears' carrying live nuclear weapons. Such alerts, although providing perhaps the ultimate nuclear deterrent, have always been costly in men and materials, while the Soviet

Below: Polar Bear. An early Tu-95 pictured in suitable Arctic surroundings. The arrangement of the aircraft's contra-rotating propellers is particularly well illustrated.

Command and Control system traditionally allowed their aircrews very little autonomy.

Basing 'Bears' north of the Arctic Circle, however unpleasant the environment and however frugal the airfields, brought suitable and worthwhile strategic targets in North America well within range.

The Tu-95MR was an all-purpose reconnaissance aircraft suited to both photo (PHOTINT) and electronic (ELINT) tasks, with the bomb bay carrying racks of cameras, and with numerous 'lumps, bumps and aerials' mounted on the fuselage. An in-flight refuelling probe was also installed. Soviet 'Bears' regularly undertook long missions designed to probe Western air defences. Now with in-flight

Left: Cold War foes. An RAF Lightning of No 5
Squadron intercepts a Tu-95KM 'Bear-C' as it
approaches UK airspace, a scenario played out
many times when tensions ran high between
East and West. The 'Bear-C' was a modified and
upgraded version of the Tu-95K, most notable for
its enhanced reconnaissance systems.
Foxbat Files Image Library

Right: As a Cold War behemoth surviving in an age of 'stealth', the Tu-95 is something of an anachronism, as testified by its rear gun turret, more akin to a World War 2 bomber.

Foxbat Files photo by Dmitriy Pichuqin

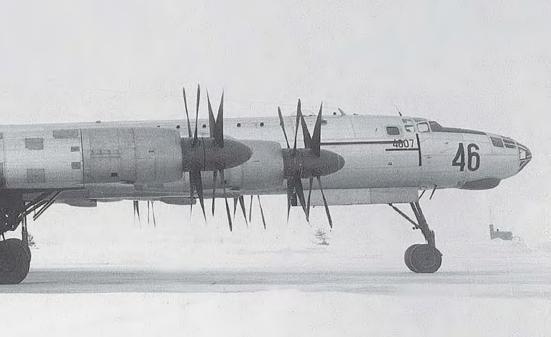
refuelling, the aircraft's endurance was limited mainly by factors of crew fatigue. Taking off from an airfield on the Kola Peninsula, one can imagine a 'Bear' on a training sortie coming around the North Cape and soon afterwards being intercepted by Norwegian Starfighters who shadow it for a while. Later in its flight it approaches the vast UK Air Defence region, and RAF fighters – Lightnings or Spey Phantoms – are launched from Leuchars to assess its intentions. Somewhere well to the north of the Scottish mainland, the 'Bear's' captain announces to his crew: 'OK comrades, where's it to be today? Angola or Cuba?'

The final new-build production version, the Tu-95MS, was a specialised cruise-missile carrier, capable of carrying up to six Kh-55 subsonic missiles internally on a rotary launcher in the bomb bay and on under-wing pylons. 88 were built, NATO christening this variant 'Bear-H'.

The Russian front-line force of 'Bears' is diminishing, but money has been spent even in recent years on upgrades to the fleet, and no real replacement type has been identified. Few aircraft types have ever proved so good a return on investment.







Tupolev Tu-95M 'Bear-A'

 Crew:
 9

 Length:
 151ft 5in (46.1m)

 Wingspan:
 164ft 2in (50.0m)

 Height:
 39ft 9in (12.1m)

 Weight empty:
 186,000lb (84,300kg)

 Max. T/O weight:
 401,200lb (182,000kg)

 Max Speed:
 565mph (910km/h)

 Range:
 8,200 miles (13,200km)

Powerplant:

4 x Kuznetsov NK-12M turboprops rated at

turboprops 15,000hp

Armament: (defensive) 6 x AM-23

cannon in three positions. (offensive) 12,000lb of bombs, free fall nuclear or HE







intended for retaliation strikes against major targets in the US, however it proved unsuitable as a first-response weapon and was relegated to

secondary strikes against targets.

Foxbat Files Image Library

Crew:

Armament:



★ Myasishchev M-4 and 3M 'Bison'

f there was a direct Soviet equivalent to the Boeing B-52 it was Myasishchev's M-4. This four-engined jet bomber design was intended to give the Soviet Air Force the ability to bomb the continental USA, but in the event the M-4 proved to have insufficient range to make the full out-and-return flight.

First flight was on 20 January 1953. The aircraft came into public view in July 1955 at an air show at Tushino in July 1955, when a relatively small number of M-4s made more than one pass over the airfield to give the impression that the type was already

Above left: The Soviet's answer to the B-52, the 'Bison' was a beast of an aircraft, with impressive dimensions. However it was badly underpowered and its role as a bomber was short-lived. Foxbat Files Image Library

Left: The Myasishchev 3MD 'Bison' quickly became an endangered species and sightings by the West were rare. In the early 1960s, the 'Bison-C', with a specialised search radar, was introduced, but by this time, many of the original M-4s had been converted to M-4-2 fuel tankers for aerial refuelling. Later, 3Ms were converted to 3MS-2 and 3MN-2 tankers as well.

Foxbat Files Image Library

Below: The Myasishchev 3MD variant of the 'Bison' was built from the outset as a missile carrier. Depicted is '30 Red' (c/n 6302831) the only surviving example of 11 built. It currently resides at the Central Russian AF Museum at Monino. Foxbat Files artwork by Andrey Zhirnov

in widespread service. Taken with other intelligence assessments and 'authoritative' articles in the American aviation press, this gave rise to American fears of a 'bomber gap' existing between US and Soviet forces.

The aircraft had a 'bicycle' undercarriage, with main gear legs in front of and behind the bomb bay, and balancing outriggers in fairings at the wing tips. This was a massive aircraft with a 165ft wing span which looked every inch a capable strategic bomber, but it was underpowered and poor fuel economy severely limited range. The type was allocated the NATO reporting name 'Bison', the M-4 becoming the 'Bison-A'. In fact, this variant never entered fullscale service and production soon switched to the much improved Myasishchev 3M, which first flew on 27 March 1956 and went into full production later that year. This version was given the code name 'Bison-B'. Re-engined and with armament reduced, the 3M got closer to the original design range.

While the aircraft never made a name for itself as a bomber, many M-4 and later 3M were converted as flight-refuelling tankers, a role in which they remained until the early 1990s. Total production of all variants is believed not to have exceeded 100 aircraft.

Myasishchev M-4 'Bison-A'

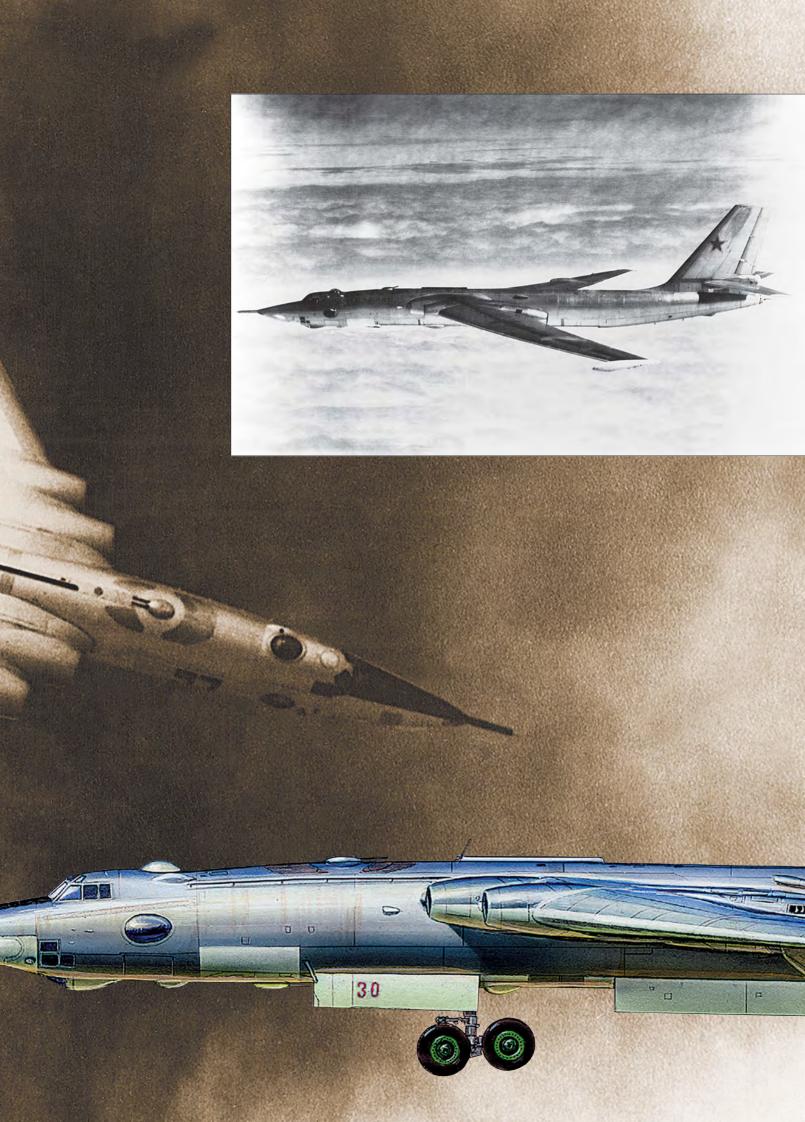
Length: 154ft 10in (47.2m) Wingspan: 165ft 7in (50.5m) Height: 46ft 3in (14.10m) Weight empty: 175,700lb (79,700kg) Max. T/O weight: 400,135lb (181,500kg) Max Speed: 588mph (947km/h) Range: 5,030 miles (8,100km) **Powerplant:** 4 x MikulinAm-3a turboiets

> (defensive) 9 x NR-23 cannon in three

> > positions. (offensive) Typically 19,840lb of bombs, free fall nuclear or HE. Up to 4 x cruise missiles carried externally







★ Tupolev Tu-22 'Blinder'

upolev's Tu-22 was developed to meet the perceived need in the early 1960s to replace the Tu-16 with a supersonic aircraft. Detailed design began in 1955, with the aim of producing a medium-range bomber with the ability to strike targets in Europe and Asia.

Below: A true child of the sixties, the futuristic Tu-22 certainly looked the part, though its handling characteristics did not live up to the image. The 'Blinder' was gradually phased out of Soviet service in favour of the more-capable Tupolev Tu-22M.

First flight of the prototype took place from Zhukovsky on 21 June 1958 and series production was approved shortly afterwards, the type supplanting the Tu-16 on the line at Kazan. First public showing was at Tushino in July 1961, when 10 aircraft overflew the assembled 'Soviet Air Forces Day' crowds. It is said the type was initially allocated the NATO reporting name 'Bullshot', surely by someone with a sense of humour, but that this was later changed to 'Blinder' as being 'more appropriate'. This may be apocryphal, but it's the sort of story you really want to believe.

With a futuristic streamlined design with two large afterburning turbojets sitting podded at the tail, the Tu-22 proved to have a disappointing performance. Initial production was of two versions. The Tu-22B 'Blinder-A' was a bomber, armed primarily with free-fall bombs, which entered service in September 1962. Pilots never liked it, not only for its flying characteristics – it was criticised for being heavy and tiring to fly – but also for the restricted forward view through the sharply-pointed windscreen. In the event, the 15 aircraft built served mainly for training. The Tu-22R was the



reconnaissance version, 'Blinder-C', and carried a comprehensive camera fit in the bomb bay as well as chaff dispensers in the rear of the undercarriage pod, although it retained a bombing capability. Later modifications gave this variant IR linescan equipment. The Tu-22K was the specialised missile carrier and proved to be the major production variant. Initial armament was a Kh-22 stand-off missile, carried semi-recessed into the bomb bay. The Kh-22 (otherwise known as the AS-4 'Kitchen') could fit a nuclear warhead and was designed for antishipping duties, with the US Navy's Sixth Fleet very much the sort of target its designers had in mind. The test programme of Tu-22K and Kh-22 was far from successful, but series production of both aircraft and missile was already under way and service introduction took place in

1965. Some 76 Tu-22Ks were built in a total production run of over 300.

Despite its failings and its unpopularity, the Tu-22 lasted in service through the 1990s, although primarily in the reconnaissance role. Its replacement would be a new aircraft, again from the Tupolev stable, which would prove far more successful.

Bottom left: The only Soviet combat use of the 'Blinder' occurred in 1988, during the Soviet war in Afghanistan. Radar-jamming Tu-22PD aircraft covered Tu-22M bombers operating in Afghanistan near the Pakistan border, protecting the aircraft against Pakistani air defence activity.

Below: Early Tu-22s (such as Bort 32, 5050051) did not feature a refuelling probe. This aircraft is now on display at Monino.

Foxbat Files artwork by Andrey Zhirnov

Tupolev Tu-22K 'Blinder-B'

Crew: 3

Armament:

Length: 136ft 6in (41.6m) **Wingspan:** 77ft 5in (23.6m)

Height: 32ft 8in (10.0m)

Weight empty: 106,000lb (48,100kg) **Max. T/O weight:** 207,000lb (93,900kg)

Max Speed: 940mph (1,510km/h)

Range: 3,000 miles (4,800km) **Powerplant:** 2 x Dobrynin RD-7M

turbojets rated at 24,000lb dry and

36,400lb in afterburner

(defensive) 2 x R-23 cannon in rear fuselage.

(offensive) Kh-22

(offensive) Kh-22 stand-off weapon



Tupolev Tu-22M 'Backfire'

ig and menacing, the supersonic, variable-sweep wing, long-range strategic and maritime Tu-22M 'Backfire' bomber was intended to follow the Tu-22 'Blinder', a type which had singularly failed to replace the much earlier Tu-16 'Badger'.

There was a competition between the design bureaus of Tupolev, Myasischev, Sukhoi and Yakovley, with some of the proposals featuring very large and complex aircraft offering strategic range. In the end, Tupolev won the day with the Tu-22M and the promise that the new aircraft was based on the company's earlier Tu-22. In fact even a cursory look at the new design, with its variable geometry wings and two NK-144 (later NK-22) turbojets now installed totally within the

fuselage, revealed that commonality between the two was minimal. A degree of area-ruling was evident in the contours of the fuselage to limit high-speed drag, the four crew members were seated in a pressurised crew compartment and the engine intakes were fitted with a movable ramp to control the shock wave in the intake duct. While the variable geometry 'swing wings' were primarily to improve short field take-off performance, this was – unlike the Tu-22 before it - a Mach 2 aircraft.

First flight by the prototype was on 30 August 1969. Production aircraft designated Tu-22M1 started coming off the Kazan line, which had previously built the Tu-22, from 1971. Unlike the earlier aircraft, the Tu-22M was primarily a missile carrier, standard armament initially being a single Kh-22 semi-recessed into the

bomb bay. The new aircraft was welcomed by its crews; handling was good and the view from the cockpit vastly improved. American intelligence assessments of the performance and particularly the range - of the Tu-22M were wide of the mark, considerably over-estimating the type's fuel capacity and hence its range. In fact, with a single Kh-22 its realistic unrefuelled combat radius was no more than 1,500 miles.

Service introduction of the Tu-22M was not without its problems. Engine time between overhauls was at best 50 hours and this fact led to an edict to pilots to 'take it easy' with engine thrust to limit turbine temperatures in an effort to prolong engine life. The Tu-22M2 'Backfire-B', the definitive production standard aircraft, entered service with both the air force and naval aviation regiments. While the former used



the aircraft in the strategic bomber role, naval aviation saw it primarily as a counter to US Navy battle groups.

A comprehensive weight-reduction programme, improved avionics and developed NK-25 turboiets gave rise to the final production variant, the Tu-22M3 'Backfire-C'. With the Kh-22 now becoming less effective, a new stand-off weapon was introduced as the Kh-15. With a nuclear or conventional warhead, the Kh-15 had the capability to make its final diving approach to its target at Mach 5, making it far more difficult to intercept. Maximum bomb load of the Tu-22M3 was 12 tons carried internally or up to 24 tons with the addition of underfuselage racks and under-wing pylons, while the bomb bay could carry a rotary launcher for six Kh-15 air-to-surface missiles. The Tu-22M3 was, numerically speaking, the major production variant in a total run that approached 500 examples and continued into the mid-1990s ie well beyond the end of the Cold War. Some continue in Russian service to this day.





Above: Big and menacing, significant numbers of the Tu-22M3 'Backfire-C' remain in service with the Russian Air Force, such as these examples taxying out at Ryazan Dyagilevo in an impressive show of strength. Alexander Beltyukov

Left: A Russian AF 'Backfire-C' departs from its base at the start of another long-range mission. During the Cold War, the Tu-22M was operated by the Soviet Air Force (VVS) in a strategic bombing role, and by the Soviet Naval Aviation (Aviacija Vojenno-Morskogo Flota, AVMF) in a long-range maritime anti-shipping role.

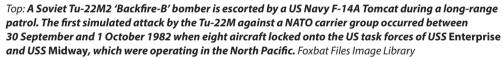
Foxbat Foxbat Files photo by Yevgeniy Kazennov

Tupolev Tu-22M3 'Backfire-C'

Crew: Length: 139ft 4in (42.5m) Wingspan: 112ft 6in (34.3m) wings fully forward Height: 36ft 3in (11.0m) Weight empty: 128,000lb (58,050kg) Max. T/O weight: 277,800lb (126,000kg) Max Speed: 1,400mph (2,250km/h) Range: 4,200 miles (6,760km) **Powerplant:** 2 x Kuznetsov NK-25 turbofans rated at 31,500lb dry and 55,100lb in afterburner **Armament:** (defensive) 1 x GSh-23 23mm cannon in rear fuselage. (offensive) Kh-15 or Kh-22 stand-off weapons, up to 24 tons of free-fall bombs carried internally and on pylons







Above: The Tu-22M suffered from widespread maintenance issues during its service with the Soviet forces. These stemmed from poor manufacturing quality. Foxbat Files Image Library

Right: Carrying a Raduga Kh-22 anti-ship missile under its port wing, a Tu-22M3 returns from a mission. The 'Backfire' was first used in combat in Afghanistan in December 1987, but more recently the bomber has played an important part in Russia's air campaign in Syria, operating from its home airfields and from Iran's Hamedan Airbase. Foxbat Files photo by Sergey Krivchikov

Below: Tupolev Tu-22M2 'Backfire-B' bomber, Bort 42 red, 43rd Combat Training and Flight Crew Training Centre, Dyagilevo AB, Ryazan, mid 1980s. Artwork © Zaur Eylanbekov









★ Tupolev Tu-160 'Blackjack'

Ithough essentially outside the 'Cold War' parameters of this issue, mention must be made of the Tu-160, the Soviet Union's only truly strategic supersonic bomber to enter service. Featuring variable geometry wings, it resembles in many ways a B-1B Lancer on steroids, but is an altogether larger aircraft.

While the first prototype flew on 19 December 1981, the type's progress into full operational service was slow and it was only in summer 1987 that a front-line unit started its work-

up. The Tu-160 'Blackjack' is primarily a missile carrier equipped with nuclear-tipped cruise or supersonic stand-off missiles. Total production did not exceed 40 aircraft, this figure including prototypes, although in 2015 it was announced that an updated version will be put back into production as the Tu-160M2 fitted with new engines, new radars and new avionics. Capable though this aircraft undoubtedly is, the lateness of its arrival in service meant that it had only a limited effect on the outcome of the Cold War.

Above: Viewed head-on, the undoubted influence of the Rockwell B-1B Lancer on the Tu-160's design is all too apparent, but there the similarity ends. The Tu-160 is much larger (about 30%) and much faster than the B-1B, with a maximum take-off weight of over 606,000lb and top speed greater than Mach 2.05. Foxbat Files photo by Yevgeniy Kazennov

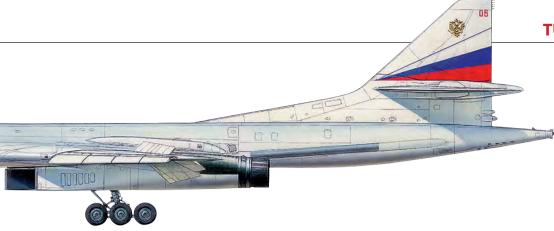
Right: A 'Blackjack' returns to terra firma after a mission from Engels AB. Dwarfing the B-1B Lancer, the Tu-160 is the heaviest combat aircraft ever built.

Foxbat Files photo by Yevgeniy Kazennov











Left: Shown as it looked in the early 2000s, this 'Blackjack' belonged to the 121st GvTBAP and is still based at Engels AB. Along with the other Tu-160s it is scheduled to go through a series of upgrades to its internal and weapons systems. Foxbat Files artwork by Andrey Zhirnov

Far left: **Arguably the most powerful aircraft** ever put into production, a Tu-160 thunders into the sky as it departs Engels AB, home of the 'Blackjack'. Nineteen Tu-160s were also delivered to the 184th Guards Heavy Bomber Aviation Regiment at Priluki (Ukraine). These were left at the Ukrainian base after the break up of the USSR in 1991 and, after protracted discussions between Ukraine and the Russian Federation, eight were returned to Russia in 1999.

Foxbat Files photo by Yevgeniy Kazennov

Left: A Tupolev Tu-160 launching a Kh-101 cruise missile against targets in Syria in November 2015, watched from a discreet distance by a Sukhoi Su-30SM.

Below: The Tu-160's primary armament has always been long-range cruise missiles like the Kh-55MS, of which it can carry a dozen. More recently however, the Russians have used the conventional version Kh-555 version of the cruise missile against targets in Syria alongside much more advanced and stealthy Kh-101 cruise **missile.** Foxbat Files photo by Yevgeniy Kazennov



Vickers Valiant

he origins of the Vickers Valiant, the first (in every sense) of Britain's three V-bombers, can be traced back to 1946. The British government, fully aware of the significance that World War 2 had been ended by the dropping of two atom bombs, realised that it needed to develop its own nuclear weapons and to have the means to deliver them over long distances. While scientists wrestled with the physics to produce a viable bomb of a suitably small size (all things are relative), Britain's aircraft industry started refining designs for four-jet bomber aircraft to deliver them a decent distance into the Soviet Union, which was by then emerging as the likely enemy in any future European war.

Specification B35/46 (ie bomber specification 35 of 1946) was issued to industry, requiring an aircraft capable of Mach 0.875, a range of 3,350 miles (London to Moscow is 1,560 miles!) and the ability to reach 50,000ft. With such an ambitious level of performance, it was considered that enemy fighters would be unable to get anywhere near to effect an interception, so no defensive armament was specified. Planning for the first British atom bomb (or 'special weapon' as it was euphemistically referred to), envisaged a casing 24ft in length and 5ft in diameter. Safety considerations, including aerodynamic heating, required it to be stowed internally, which necessitated the provision of a huge bomb bay.

Right: The Vickers Valiant became the RAF's first strategic nuclear bomber when it entered service in 1955. Embedded in the big wing were its four Roll-Royce Avons.

Vickers Valiant B1

Crew:

Length: 108ft 3in (33m) Wingspan: 114ft 4in (34.8m) Height: 32ft 2in (9.8m) Weight empty: 75,881lb (34,420kg) Max. T/O weight: 175,000lb (79,400kg) **Max Speed:** 560mph (900km/h) 4,500 miles (7,250km) Range: 4 x Rolls-Royce Avon **Powerplant:**

RA 28 rated at 10,000lb 21 1,000lb HE bombs/ **Armament:** Blue Danube atom bomb

become the Vulcan, while Handley Page offered an equally futuristic design as the HP80, which would be built as the Victor. Vickers at Weybridge came up with a somewhat less ambitious - but still extremely advanced four-jet design as the Type 660, which would later be christened Valiant. Sir George Edwards, Vickers' Chief Designer, is quoted as saying that he aimed to make the Valiant an 'unfunny aircraft' of straightforward design which would be ready for squadron service earlier than either of the other two. A revised (ie less ambitious) specification was issued as B9/48 for a 'medium range bomber' to accommodate it, this being one of those rare cases where a ministry specification was written around an aircraft

Avro tendered its Type 698, which would

In the event, all three designs were built, as the Valiant, Vulcan and Victor - Britain's legendary trio of V-bombers. How Britain could justify building three different designs of V-bomber when the total requirement would prove to be less than 350 remains one of life's

manufacturer's offering, rather than the other

way around.

brought Britain into the atomic age and all three served the RAF well.

Three Valiant prototypes were ordered and construction got under way at the company's Foxwarren experimental site, with final assembly at its nearby test airfield at Wisley. WB210, the first of the three, took to the air on 18 May 1951, its pilot being 'Mutt' Summers who, just 15 years before, had made the first flight of the prototype Spitfire. The Valiant appeared at the 1951 SBAC show at Farnborough, where it wowed the crowds with its fighter-like performance. Given the high priority accorded to the programme, 25 production Valiants had already been ordered in April 1951.

Powered by four Rolls-Royce Avon turbojets buried in the wing root, the Valiant also had provision for the fitting of a Super Sprite Rocket under each inner wing to provide a yet more sprightly (sorry!) take-off performance. The pressure cabin in the forward fuselage housed the five crew members, with two pilots in



ejection seats (Martin-Baker Mk 3A) but no such provision for the three rear crew members. This design feature (ie design failing) was repeated in the two following designs of V-bombers; as a result, rear crew members had a significantly reduced chance of surviving a catastrophic situation in the air.

The initial version, the Valiant B1, was a pure bomber, designed for the strategic nuclear role but perfectly capable of dropping conventional iron bombs if required. The Valiant was the aircraft on which RAF Bomber Command learned and perfected its new role of nuclear deterrence as the Medium Bomber Force (MBF) started its build-up. The first UK atomic bomb named Blue Danube was delivered to the RAF at the end of 1953, although the initial front-line Valiant unit, No 138 Squadron, did not form until 1 January 1955. By the close of 1956, production of the Valiant had allowed the RAF

to reach its planned strength of seven

front-line squadrons. These were based at four 'Class 1' airfields, but dispersal plans would see the force spread across the UK in flights of two or four aircraft in times of political tension, thus increasing survivability.



Above: A stunning portrait of the Vickers Valiant prototype, WB210. At the Farnborough air show in September 1951 WB210 made a lasting impression with its performance, taking off and climbing steeply like a fighter and exhibiting extreme (for a bomber) manoeuvrability. However, tragedy was to strike on 12 January 1952 when WB210 crashed in Hampshire following a fire in the wing. All the crew escaped save the co-pilot Sqn Ldr B. Foster, who died when his ejection seat hit the tailplane on egress.









Quick Reaction Alerts (QRA) were established in 1962 to provide fully-armed aircraft with crews at 15-minute readiness to launch, with each V-bomber squadron providing one (later two) aircraft. These, plus no-notice alerts and long-distance Ranger flights to test the crews' self-sufficiency, honed the V-Force into a formidable deterrent.

Valiant production totalled 104 aircraft. Not all were pure bombers. The B(PR)1 was a photo reconnaissance variant, the BK1 introduced the option of mounting flight refuelling gear in the bomb bay, while the B(PR)K1 was capable of all three roles – the true multi-role Vickers Valiant.

Valiant 'firsts' included the dropping of the first Blue Danube in Operation 'Buffalo'

Above left: Valiants of No 232 OCU lined up at RAF Gaydon in 1956. Of the V-bomber triumvirate, the Valiant was the most conventional in design.

Left: Cold War warriors – a Valiant crew sprint to their waiting bomber during an alert. A pressurised crew compartment contained the five crew members. The two pilots sat on Martin-Baker Mk3A ejection seats, while the three rear crew members were rearward-facing and, in time of emergency, had to bail out through a side entrance hatch.

Top: A Valiant scramble being re-enacted at Farnborough. For many years, the Valiant could claim to be the only V-bomber to have dropped bombs in anger, four squadrons having taken part in Operation 'Musketeer', the Suez campaign in 1956. Only late in its career did the Vulcan achieve the same distinction, attacking Port Stanley airport in the Falkland Islands in 1982.

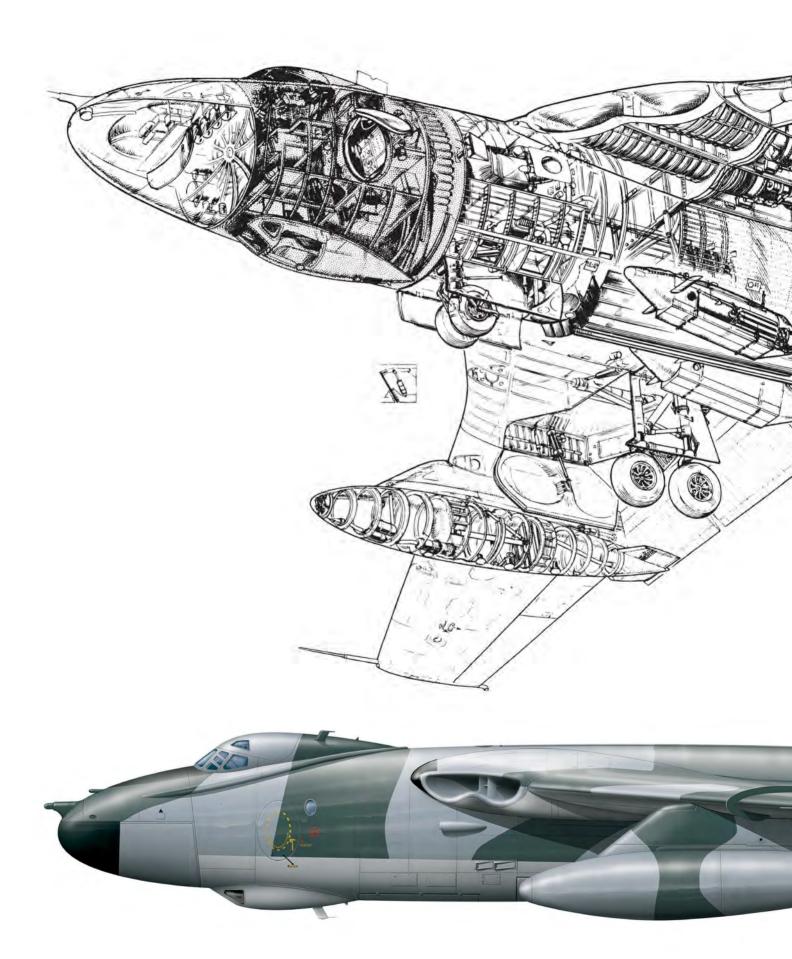
Right: A Vickers Valiant blasts off from its birthplace at Brooklands, Weybridge. Although the Valiant was very much a 'pilot's aircraft', it was at its most temperamental during take-off. at Maralinga, South Australia on 11 October 1956. Operation 'Musketeer', the ill-fated British Suez campaign of October/November 1956, saw the Valiant tasked as an iron bomber, and 24 aircraft undertook missions to drop 1,000lb bombs onto Egyptian airfields and defence installations until a halt was called to the British intervention.

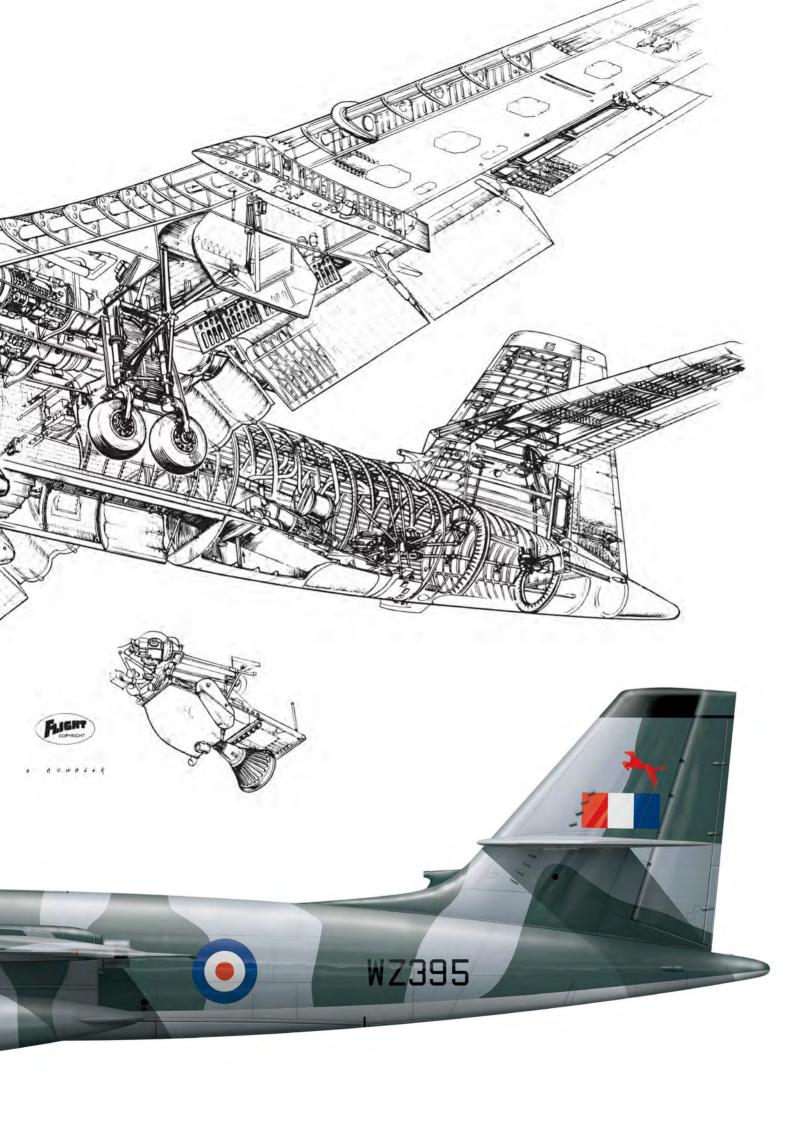
Increasing deliveries of the more advance Victor and Vulcan allowed the Valiant progressively to be assigned a tactical role under NATO control from the start of 1960. This Tactical Bomber Force (TBF) commitment meant having aircraft at 15-minute readiness with US-built Mk 28 tactical nuclear weapons. With the increasing effectiveness of Soviet air defences, TBF Valiants started practising low-

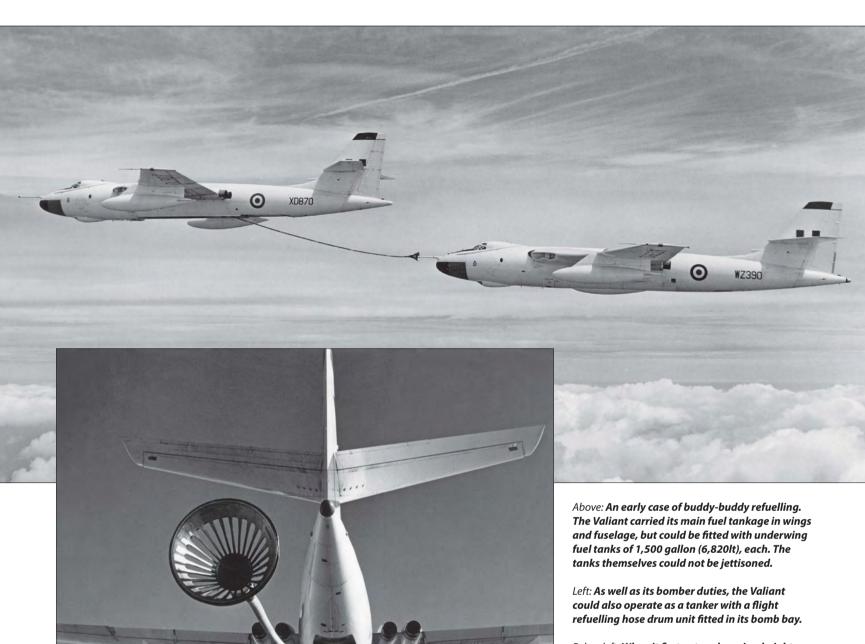
level target approaches from 1963, now using parachute-retarded Mk 43 nuclear weapons.

The low-level environment took its toll on the Valiant's structural integrity. B(PR) 1 WP217 suffered a major in-flight wing failure on 6 August 1964. The crew landed safely, but examination of the fleet showed fatigue problems affecting both front and rear spars in other RAF examples. All Valiants were grounded late in 1964 while an extensive and probably expensive rebuild plan was discussed with Vickers. Then, in what some consider a shameful and short-sighted decision, HQ Bomber Command announced on 26 January 1965 that the type was to be permanently withdrawn from service. The RAF's Valiant era had lasted just 10 years.







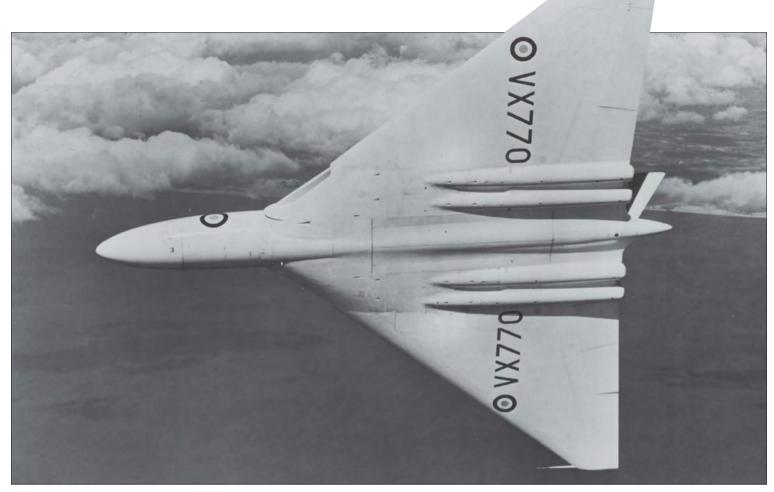




Below left: When it first entered service, height and speed protected the Valiant from attack. Only the Valiant of the three V-bombers has the distinction of dropping nuclear weapons, the type having been used extensively in British trials in the southern hemisphere through the 1950s. A large bomb bay could accommodate a single Blue Danube 'special weapon' with a yield of 15 kilotons. In the conventional bombing role, the Valiant could carry 21 1,000lb (454kg) bombs and was used in this way during the Suez crisis of 1956.

Right: Vickers Valiant B1, WZ395 of No 49
Squadron, RAF Marham, circa 1964. By 1963
the increasing sophistication of Soviet air
defences meant that RAF Valiants would have
to make low-level approaches to their target.
An appropriate grey/green camouflage scheme
was introduced in 1964. Valiant B1 WZ395 was
one of a very few of the type to be finished in
this tactical camouflage scheme before fatigue
cracks, brought on by the low-level flights,
caused the rapid grounding of the fleet.
Rolando Uqolini/Airlinerart





V-bombers – but if there was, the Vulcan has the strongest claim to such a title. Avro's delta-winged design was produced in greater numbers (134 production aircraft), proved more adaptable to changes of role and armament, and was used for longer in its original bomber role than either of the other designs.

The Vulcan was created by a team under the leadership of Roy Chadwick and featured a massive delta wing (a 'pure' delta shape with

Top left: V-bombers unite as a Vulcan takes on fuel from a Valiant tanker. Nine RAF squadrons operated the Vulcan, which became the backbone of RAF Bomber Command and served in the bomber role until 1982, and as a flight refuelling tanker for two years beyond that.

Centre left: **Vulcan B1 XA912 of No 101 Squadron, RAF Finningley.** Rolando Ugolini/Airlinerart

Left Avro Vulcan B2 XL321 with Blue Steel missile, No 617 Squadron, Scampton Wing, circa 1969. Rolando Ugolini/Airlinerart straight wing leading edges in the prototype aircraft) containing four turbojets buried in the wing root, fed by long slit air intakes. Also housed within the wing were the eight-wheel bogie main undercarriage legs, fuel tanks and retractable air brakes. The engines were always planned to be Bristol Olympus, although prototype VX770 fitted four Rolls-Royce Avons.

VX770 made its first flight from Woodford on 30 August 1952, piloted by the inimitable R. J. 'Roly' Falk, Avro's chief test pilot whose trademark was to fly in a lounge suit rather than a flying suit. Just three days later at the Farnborough show he displayed the Vulcan's impressive manoeuvrability, flying it solo and with the benefit of just three hours on type.

The second prototype, VX777, was more representative of the intended production Vulcan and fitted four Olympus Mk 100 engines. Ordered into production as high priority to strengthen the RAF's Medium Bomber Force, 45 Vulcan B1s were built. Initially, two front-line squadrons – Nos 83 and 101 – were formed alongside 230 Operational Conversion Unit (OCU).

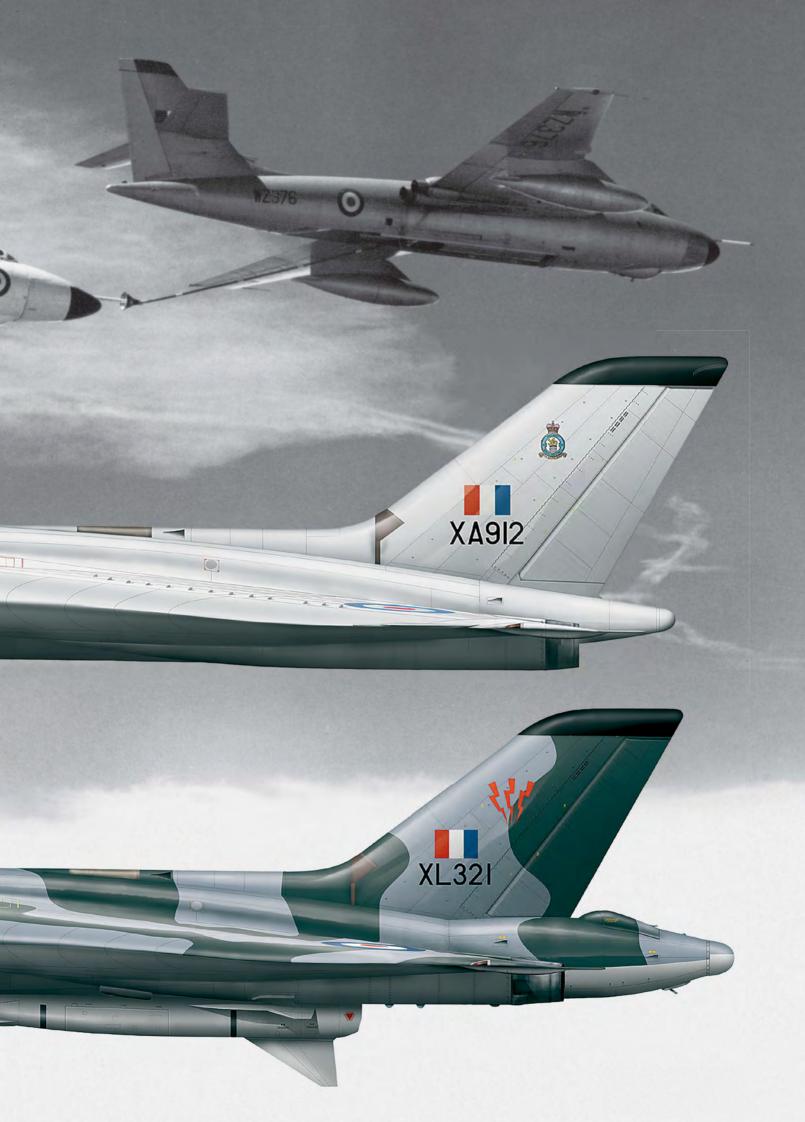
Above: **The Avro Vulcan prototype, VX770, showing off its pure delta planform.**

While very early aircraft featured the pure delta wing, a 'cranked' leading edge was found to offer improved handling characteristics and was introduced on the production line and then retrofitted.

By late 1957 the Vulcan B1 was well established in service and current thinking was that the type's altitude performance and manoeuvrability would ensure its survivability over hostile territory. Avro was also planning the Vulcan B2, with more powerful Olympus engines, increased span and electronic countermeasures (ECM) equipment in an enlarged tail cone. The B2 was to be the major production variant, with 89 examples built, the first delivery to the RAF being on 1 July 1960.

As a stopgap measure, 29 Vulcan B1s were rebuilt as the B1A with the ECM fit and bulged rear fuselage of the B2, but eventually all squadrons standardised on the B2. Nine RAF squadrons flew the Vulcan – Nos 9, 12, 27, 35, 44, 50, 83, 101 and 617.





Avro Vulcan B2

Crew: 5

Length: 99ft 11in (30.4m) Wingspan: 111ft (33.8m) Height: 27ft 1in (8.2m) Weight empty: 99,630lb (45,190kg) Max. T/O weight: 204,000lb (92,530kg) Max Speed: 645mph (1,040km/h) Range: 4,000 miles (6,440km) **Powerplant:** 4 x Bristol Siddeley Olympus 201 rated at

17,000lb

Armament: up to 21 1,000lb bombs,

one Yellow Sun nuclear weapon, one Blue Steel stand-off weapon

Right and below: Vulcan production in full swing at Woodford. In May 1956 the Vulcan B1 was issued to the RAF's Vulcan Operational Conversion Unit, 230 OCU, at Waddington. Strangely, early production aircraft were delivered in an overall silver finish.







The Vulcan's bomb bay could carry a single nuclear weapon or up to 21 1,000lb bombs. In parallel with the B2, Avro had been developing the Blue Steel stand-off weapon, a rocketpowered Mach 2+ nuclear-armed missile with a range of 100 miles. This weapon avoided the need to overfly defences in the target area and would deliver the warhead with a supersonic dash. In the event, 53 production examples were built and were issued to a number of Vulcan B2 and Victor B2 squadrons. The weapon proved difficult to 'match' to the carrier aircraft and temperamental and unreliable in service. Because of its size (10.7m in length and 17,000lb fully fuelled), the Blue Steel round was carried semi-externally in the bomb bay. Blue Steel became operational with No 617 Squadron in February 1963, but the decision later that year to re-role the Vulcan fleet to lowlevel attack, flying at 1,000 or even 500ft above the ground to avoid enemy radar and SAMs, rendered Blue Steel yet less effective.

Both Victor and Vulcan – as well as the VC-10 – were put forward as potential launch platforms for the Douglas Skybolt, a true air-launched ballistic missile with a range exceeding 1,000 miles. The UK government

Right: In the Cold War, Britain's deterrent posture assumed just a four-minute warning of a Soviet attack. The requirement was for the V-bomber force to be able to launch within this time. The Vulcan proved well capable of achieving this, the procedure being honed in frequent readiness exercises.

put all its faith for the UK strategic deterrent into Skybolt, selecting the Vulcan B2 as the initial launch platform before the programme was cancelled in December 1962. This was a hammer blow for the RAF. A hurried agreement was reached to allow Britain to purchase the American Polaris SLBM, but this decision

Left: The mighty Vulcan, without doubt one of the most charismatic aircraft to ever take to the skies. After the naming of the Vickers Valiant, the Chief of the Air Staff, Sir John Slessor, decreed that Avro's and Handley Page's bombers should similarly be given names starting with 'V'. Thus the Type 698 became the Vulcan – and the legend of the 'V-bombers' was born.

handed future control of the UK deterrent to the senior service and effectively ended all future lines of V-bomber development.

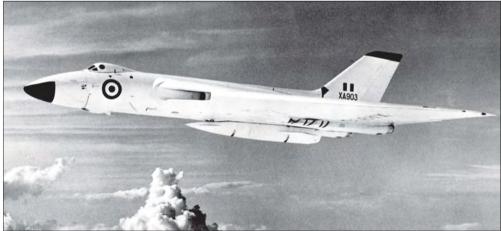
The Vulcan's role as part of the strategic deterrent ended on 30 June 1969, when responsibility for the UK's strategic deterrent passed to the Royal Navy's Polaris-armed submarines. In 1982 a Vulcan flew from Ascension Island to Port Stanley to attack the runway that was being used by Argentine forces during their occupation of the Falkland Islands. This incredibly long-range mission, which required the back-up of numerous Victor tankers, is pointed to by proponents of the Vulcan as the type's finest hour. The Valiant may have dropped bombs operationally in the Suez crisis, but the Vulcan took part in a war that Britain actually won!

The Vulcan was to soldier on in the tanker role (a hasty post-Falklands conversion) until 31 March 1984 when No 50 Squadron disbanded, marking the end of 27 years of RAF Vulcan operations.









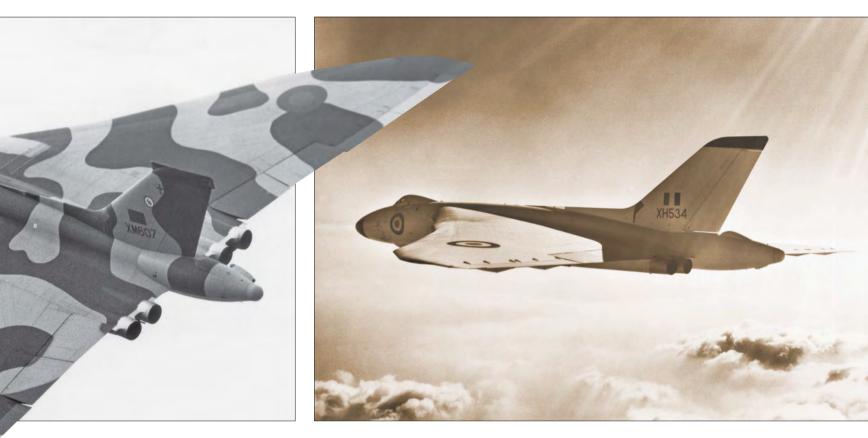
Top: The front cockpit of the Vulcan with its fighter-like joysticks. The pilots sat on Martin-Baker 3KS ejection seats. The other three crew members faced rearwards and had swivelling seats to provide assisted exit in case of emergency. Entry to the cockpit was by an extending ladder in the lower forward fuselage.

Above: White wonder. The Vulcan B2 carrying the Blue Steel rocket-powered stand-off weapon. The Vulcan's great advantage over the Handley Page Victor was its adaptability. Its good ground clearance made it more suitable for the installation of the Blue Steel weapon, also produced by Avro, and introduced to some of the squadrons from late 1962.

Top centre: The Vulcan had a reputation for handling like a fighter, an impression heightened by the provision of a stick for the pilot rather than the more conventional yoke. Because of its QRA commitment, the Vulcan was fitted with a system that allowed all four engines to be started at the same time.

Top right: The usually quoted service ceiling of the Vulcan was 55,000ft, but an aircraft with no bomb load and minimum fuel could get to 60,000ft, an altitude at which the Vulcan still proved manoeuvrable and able to look after itself from any predatory fighters.

Right: The Vulcan saw out its final days in service at RAF Waddington in service with No 50 Squadron, whose aircraft are pictured here just prior to the last ever 'scramble' in 1984. Allan Burney







B2(R)

Handley Page Victor B2(R)

Crew:

 Length:
 114ft 11in (35m)

 Wingspan:
 120ft (36.6m)

 Height:
 28ft 1in (8.6m)

 Weight empty:
 109,950lb (49,900kg)

 Max. T/O weight:
 223,000lb (101,150kg)

 Max Speed:
 645mph (1,040km/h)

 Range:
 3,800m (6,115km)

Range: 3,800m (6,115km) **Powerplant:** 4 x Rolls-Royce Conway

17 rated at 20,000lb **Armament:** 35 1,000lb HE bombs

35 1,000lb HE bombs, one Yellow Sun nuclear weapon, one Blue Steel stand-off missile

Top: The prototype of the futuristic-looking Victor V-bomber made its maiden flight on Christmas Eve 1952 from Boscombe Down. The aircraft was impressively displayed at the 1953 Farnborough Air Show, but a year later it was tragically lost following structural failure of its tail.

Right: The Handley Page final assembly line of the Victor. The first production aircraft took to the air in early 1956 and the type received operational status in November 1957 with No 10 Squadron.

Far right: Scramble! Scramble! RAF aircrew of No 15 Squadron sprint towards their Victor B1, XH594, during a training drill. No doubt it was a matter of pride for the pilot to win the race!





andley Page's Victor was, in every sense, the last of the V-bombers. It was the last to fly in prototype form, the last to enter squadron service and the last to leave front-line RAF service, although by that time as a flight refuelling tanker. It was, though, surely the most futuristic of the designs, with a crescent wing form which had three different degrees of sweep on the leading edge, the sweep angle decreasing towards the tip, and a flight deck canopy faired in completely with the forward fuselage.

Prototypes WB771 and WB775 were constructed in the experimental shop at Cricklewood, as the main factory at Radlett was at the time busy producing Canberras for the RAF. WB771 was then partially dismantled and moved by road to A&AEE Boscombe Down for its first flight, the fuselage being covered by tarpaulin and disguised as a boat with the name 'Geleypandhy' on the side. This strange name was, thanks to a signwriter's error, actually an anagram of 'Handley Pyge'. It remains unclear how effective this ruse might have been in confusing Soviet intelligence.

First flight by WB771 was on Christmas Eve 1952, with Sqn Ldr Hedley Hazelden at the controls. Flight testing continued at Boscombe Down, but WB771 was tragically destroyed in a crash at Radlett on 14 July 1954 after the tailplane broke up at low level. Fifty Victor B1s were ordered for the RAF (XA917-922, XA923-

941, XH587-594, XH613-621, XH645-651, XH667) and the first entered service with No 10 Squadron at Cottesmore in April 1958. Like the other V-bombers in the Mk 1 form, the Victors were primarily tasked with delivering a free-fall nuclear weapon, although up to 35 1,000lb iron bombs could alternatively be carried internally.

Like the other V-bombers it had a crew of five in a pressurised compartment. Early design studies envisaged ejector seats for all five crew members, but the final layout deleted this provision for the three rearward-facing system operators.

Plans were drawn up in the late 1950s to produce a higher-flying, larger Victor as the B2, again in the belief that the aircraft could remain invulnerable to Soviet defences for a few more years. The B2 was to be powered by Rolls-Royce Conway bypass engines (turbofans) of 17,000lb (later 20,000lb) thrust rather than the Armstrong Siddeley Sapphires of the B1. Thirty four B2s were built and the type went on to serve with Nos 100 and 139 Squadrons of the Wittering Wing from early 1962. With the advent of Blue Steel, 21 B2s were returned to Radlett for a quite comprehensive conversion to carry the new weapon. The new aircraft, designated B2(R) (for retro fit) or simply B2 (Blue Steel) were most easily recognised by the over-wing fairings or 'Kűchemann carrots' shock bodies that also provided space for chaff dispensers. Nine other B2s were converted to the specialist strategic reconnaissance role under the designation B(SR)2 and served with No 543 Squadron at Wyton until 1975. Victors also provided two generation of RAF flight refuelling tankers, as redundant B1s and then B2s were converted to the tanker role, serving until late 1993.

The Victor was the most technically advanced of the V-bombers and the one with the highest performance; there is a reasonably welldocumented case of a B1 going supersonic, when HP test pilot Johnny Allam exceeded the speed of sound over the Home Counties in XA917 on 1 June 1956. It proved less suited than the Vulcan to the Blue Steel role, not least because the very limited ground clearance under the fuselage complicated loading the weapon, and was built in smaller quantities

than the other types. 15 October 1993. Allan Burney

Overleaf: The crescent wing of the Victor is shown to advantage in this rare angle on a pair of K2s basking in the tropical heat of Ascension Island in 1982, shortly after the Falklands conflict. The Victor was the last of the V-bombers to be retired, the final aircraft being removed from service on







Below: Looking like something straight out of the pages of a 'boy's own science fiction comic', the Victor was very much a product of the 1950s.



Above: A Victor B2 carrying out trials with the big Blue Steel stand-off nuclear missile. While assigned to the nuclear delivery role, the Victor was finished in an all-over anti-flash white colour scheme, designed to protect it against the damaging effects of a nuclear detonation by reflecting heat away from the aircraft.

Left: When the V-bombers were assigned to the low-level approach profile in the 1960s, the Victors were repainted in green/grey tactical camouflage to reduce visibility to ground observation; the same scheme was applied to subsequently converted tanker aircraft, as seen here.

Far left: The Victor established a successful second career for itself as an air tanker. As such it played a significant role in the Falklands crisis, providing refuelling support to its V-bomber compatriot, the Vulcan. Each Vulcan mission required the support of 12 Victor K2 tankers of Nos 55 and 57 Squadrons on the outbound leg, and a further two Victors on the return leg.



• English Electric Canberra



he English Electric Canberra was very much the mainstay of the RAF's light bomber force in the early and mid-1950s, with 24 squadrons operational at the close of 1954.

With the first of the V-bombers about to enter RAF squadron service, the Canberra air and ground crews represented a huge pool of experience in the operational employment of jet bombers. Indeed, it was from this light bomber force that many of the first V-bomber crews would come.

The Canberras, though, had only a conventional role at this time. It was not until 1958 that the Canberra squadrons with RAF Germany (RAFG) acquired a nuclear capability. The first mark of Canberra to be modified to drop nuclear weapons was the B(I)8 which then equipped three RAFG squadrons. Since no suitable British nuclear weapon existed, these Canberra units were issued with the American Mk 7 supplied to the UK under 'Project E' agreements. As with the V-bombers in the UK, RAFG Canberra B(I)8 and B(I)6 squadrons held a permanent QRA, typically with each squadron providing two aircraft and two crew on a 24-hour stint. The weapons remained under American control, with an American presence on the RAF bases to act as custodian. In practice, these arrangements worked well and the RAFG medium range strike force (where 'strike' meant 'nuclear') continued to fly the Canberra until the Buccaneer came in as replacement from early 1971.

Canberra B(I)6

Crew: Length: 65ft 6in (19.96m) Wingspan: 64ft (19.51m) **Height:** 15ft 8in (4.77m) Weight empty: 21,650lb (9,820kg) Max. T/O weight: 55,000lb (24,948kg) Max Speed: Mach 0.88 Range: 810 miles (1,300km) **Powerplant:** 2 x Rolls-Royce Avon RA7 Mk109 turbojets 8,000lb (3,628kg) **Armament:** payload of bombs, type-approved for Mk7, B28, B57 or B43 nuclear weapons, Red Beard or

WE177A nuclear bombs.

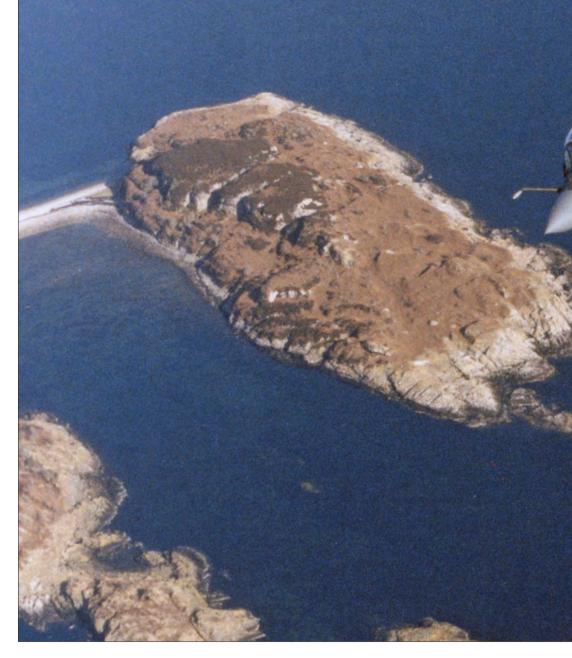
• Blackburn Buccaneer

he Buccaneer is often portrayed, perhaps unfairly, as 'the aircraft the RAF didn't want'. Through the mid-1950s and the 1960s, the air marshals always had their sights set on a supersonic design to replace the Canberra and saw the Buccaneer as a subsonic attack aircraft too lightly equipped to meet RAF requirements. Worse, it had been designed for the Royal Navy! In the event, it would give great service to the Navy, and would go on to serve with the RAF for 25 years.

While the Buccaneer's time embarked in aircraft carriers is perhaps outside the scope of this publication, mention must be made of the Buccaneer's evolution. Designed to counter the growing threat of the Soviet Sverdlov class of cruisers, it was built to allow high speed attacks at low level using conventional or nuclear weapons. The Buccaneer first flew on 30 April 1958 but the initial production S1 variant was underpowered, especially since the design incorporated 'flap blowing' (or boundary layer control) to blast high pressure air from the engine compressor over the wings and flaps to increase lift and reduce the take-off and landing speed. The S1, powered by the de Havilland Gyron Junior, only served with the Royal Navy. As a naval aircraft, it had folding wings and a radome that hinged backwards to reduce the length to fit on carrier deck lifts. It also had an internal weapons bay and a novel rotating bomb bay door, with weapons being carried on the inside of the door itself.

The Buccaneer S2, re-engined with a military version of the Rolls-Royce Spey turbofan already in production for BEA's Trident airliner, was being pursued by Blackburns even before the S1 had entered service. With the Spey, the Buccaneer's performance was transformed. The Navy's first front-line S2 squadron was commissioned on 14 October 1965 and eventually three squadrons were re-equipped, flying from the carriers *Eagle*, *Hermes*, *Victorious* and *Ark Royal*.

It was in 1968 and following the cancellation of the F-111K for the RAF that the government finally saw reason and ordered a batch of 26 Buccaneer S2 for the RAF. A number of changes were made to accommodate a wider range of weapons, the RAF variant being designated S2B. In addition, some ex-Navy



Above: Flying from Lossiemouth in Scotland, the last RAF Buccaneers were retired in 1994.

Buccaneers would later become available with the run-down of the carrier force and would then be transferred to the RAF. RAF Buccaneers went on to serve in two main roles. Two squadrons formed in the UK and were allocated maritime/anti-shipping (No 12 Squadron) and strike/attack (No 208 Squadron) roles. From 1983, both operated from RAF Lossiemouth and both were assigned the maritime role. Two squadrons also formed with RAF Germany (RAFG), based at Laarbruch and replacing the ageing Canberra B(I)8. These units (Nos 15 and 16 Squadrons) worked up to their NATO

declaration in the attack and strike (ie nuclear) roles and held a permanent two-aircraft QRA strike alert from 1973 until the type's withdrawal from RAFG early in 1984.

The RAF's Buccaneer force had its shares of highs and lows. Making a first appearance at the USAF's Red Flag exercise at Nellis AFB in 1977, RAF aircrews employed their standard tactics of high-speed, ultra-low flying (100ft and even down to 50) approach to their targets in the desert. USAF aggressor squadrons had no experience of countering such a threat, and it is said they claimed no 'kills' at all on Buccaneers



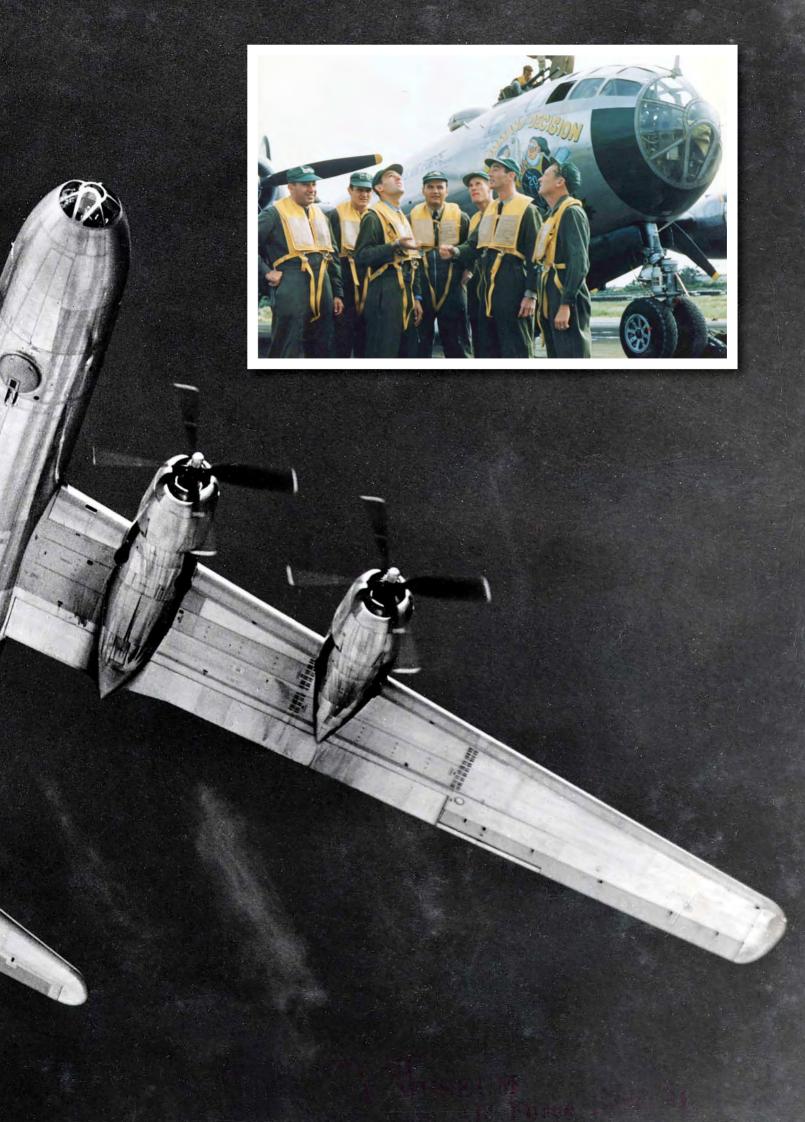
throughout the exercise. It was during the Buccaneers' third Red Flag deployment in February 1980 that S2B XV345 crashed on the Nellis range following a catastrophic failure of the starboard wing. This came as a huge surprise to all concerned; aircrews had a complete faith in the aircraft, which they claimed was hewn from a solid block of metal and 'built like a brick shithouse'. All RAF Buccaneers were immediately grounded, although the RAFG QRA alert was maintained throughout what would prove to be a six-month grounding. The failure was found to result from airframe fatigue and a rebuild programme was put into place. This resulted in something over 50 of the RAF's pre-crash fleet

Perhaps the Buccaneer's finest hour was the first Gulf War of 1991, when the Lossiemouth Wing deployed 12 Buccaneer S2s to Muharraq, Bahrain for 'Desert Storm'. Their role was to provide laser designation ('spiking', with reference to the Pave Spike designator pod) for LGB-equipped RAF Tornados. In this they proved supremely successful, the Buccaneers and Tornados together employing LGBs to destroy high value targets such as bridges and even aircraft on the ground. For this deployment the Buccaneers were painted desert pink and had unofficial nose art and names applied, with

much reference to scantily-clad ladies and brands of Scottish whisky. 250 sorties were flown by the detachment, which styled itself the 'Sky Pirates', and RAF crews later reflected that this was 'the Red Flag scenario for real'.

The end for the RAF Buccaneer force came on 26 March 1994 at Lossiemouth, when a nine-ship formation overflew the airfield as the highlight of a 'farewell weekend' for crews and families. Taxiing back to the dispersal, the nine aircraft simultaneously folded their wings and shut down their engines. And it was all over.





Boeing B-29 **Superfortress**

oeing's B-29 will always be remembered as being the first (and, we must hope, the only) aircraft ever to drop a nuclear weapon in anger. This aircraft, with its sleek fuselage, pressurised crew areas and remotely-controlled defensive gun armament, also bids fair to the title of most advanced bomber design to see service in World War 2.

A total of 3,970 examples came off four different production lines between 1942 and 1946, but the end of the war caused large scale cancellation of contracts for further aircraft and widespread withdrawal and scrapping of those aircraft already in service.

The B-29 still had an important place in the inventory when SAC was formed on 21 March

Boeing B-29 Superfortress

Crew: 11

Wingspan:

Length: 99ft 0in (30.18m)

Height: 27ft 9in (8.45m)

74,500lb (33,800kg) Weight empty:

Max. T/O weight: 133,500lb (60,560kg)

Max Speed: 357mph

Range: 3,250 miles (5,230km)

Powerplant: 4 x Wright R-3350-23

and 23A Duplex-Cyclone

turbosupercharged radial engines

141ft 3in (43.06m)

(defensive): 8 or 10 x **Armament:**

4.50in (12.7mm)

Browning M2/ANs

(offensive): 20,000lb

(9,000kg) payload

1946, and when the USAF was established on 18 September 1947. The B-29 remained the only aircraft capable of delivering the American atomic bomb, a number of aircraft having been modified to be compatible under the wartime Project Silverplate. With the end of the war the Silverplate aircraft had lost their significance and, as a result, many had been scrapped, converted or dispersed around the fleet. On the formation of SAC, great efforts were made to locate as many as possible of the Silverplate B-29s and to bring them to a common modification standard. The project name Silverplate was superseded by Saddletree in May 1947, and further B-29s were converted to make them nuclear-capable to provide a stopgap nuclear delivery system until the improved B-50 became available. As things panned out, the final B-29s in the USAF's nuclear strike force were not replaced until 1951.

Even then, the B-29 had many more years of service ahead of it with the USAF. Some 92 examples were modified by Boeing Wichita as flight refuelling tankers as the KB-29M, these using the British 'hose and drogue' system. The later KB-29P used the Boeing-developed flying boom system. The use of a rigid boom allowed a much higher fuel transfer rate and this method was adopted as standard for SAC use.

The RAF found itself, in the aftermath of World War 2, without any suitable long-range bomber, the Avro Lincoln now being very long in the tooth and the new, jet-powered Canberra some years off. As a result, 87 B-29s were ordered from the United States under MDAP (Mutual Defense Assistance Program), an announcement being made in January 1950. In RAF service they were to be designated



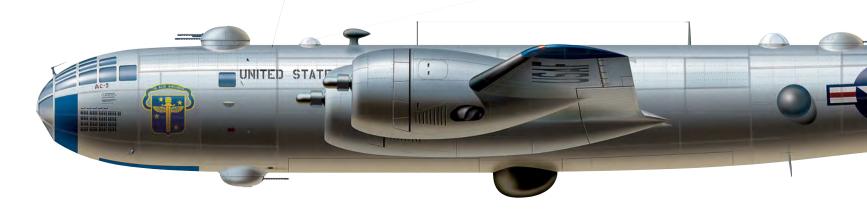
Above: A deadly accurate B-29 raid on a North Korean airfield, demonstrating that despite its World War 2 vintage, the Superfortress could still deliver a devastating strike.

Washington B1. Some of these aircraft came from active service USAF units while others were awakened from their cocooned existence in the desert. Several still bore evidence of American nose art. The first four were handed over to the RAF on 20 March 1950 at Andrews AFB, MD, and then flown to RAF Marham where they arrived two days later. Nine RAF squadrons employed the Washington, which served until 1954, by which time more modern British bomber designs were becoming available in quantity.

Top right: Capt Donald M. Covic makes a 'command decision' by flipping a coin, just like the artwork on his B-29 pictured during the Korean War.

Right: The long slender wing of the B-29 was a thing of beauty.

Below: B-29A Superfortress 44-61835, Dragon Lady, as it looked in 1951 when assigned to SAC's 19th Bomb Group in Japan for Korean War duty. A World War 2 veteran, it bombed North Korea and shot down five MiGs, but crashed in the Pacific in late 1951 killing 10 of its 12 crew. Artwork © Zaur Eylanbekov



Convair B-36 Peacemaker

o aircraft better symbolises the Cold War bomber force of USAF Strategic Air Command (SAC) than Convair's giant B-36. Conceived in the early years of World War 2, the B-36 was designed with a 10,000-mile range to give it the ability to attack targets in Japan or Germany while operating from air bases on US soil. This required a large aeroplane and the B-36 was just that, with a 230ft wing span and six (later 10) engines.

Emerging from Convair's Fort Worth plant in the summer of 1946, the B-36 revealed itself as unlike any previous bomber. With six Pratt & Whitney R-4360 Wasp Majors driving pusher propellers, it had a design bomb load of 76,000lb - almost four times that of the B-29.

Left: The last Peacemaker, Convair B-36J-10-CF 52-2827, comes to the end of the assembly line at Fort Worth, TX, in August 1954. The B-36 was in USAF service as part of Strategic Air Command from 1948 to 1959, but never fired a shot or dropped a bomb in anger.

Bottom left: Convair B-36H-25-CF Peacemaker, 51-5718 of the 42nd BS, 11th BG, 8th AF, Carswell AFB, TX, Spring 1953. Artwork © Zaur Eylanbekov

Right: **An idea as to the immense size of the B-36** was gained when the prototype was parked next to a B-29 Superfortress, then the biggest aircraft in the US inventory.

Below: The prototype XB-36, 42-13570, takes off on its maiden flight, showing its giant single tyres. Production aircraft had a four-wheel main gear instead.

First flight of the XB-36 prototype 42-13570 was on 8 August 1946, with an eight-man Convair test crew. Difficulties arose during early flights, with engine cooling and propellerinduced airframe vibration causing much head scratching by Convair engineers. The USAF was by then in two minds as to whether the B-36 was really what SAC really needed but, with the Cold War hotting up and an increasingly urgent need for a true strategic bomber capable of delivering nuclear weapons, the initial 100-aircraft order for the B-36A placed back in August 1944 was allowed to stand.

First production B-36A was 44-92004, which flew on 28 August 1947. As deliveries to SAC got under way, the 7th Bomb Wing at Carswell, TX – a military base literally 'across the field'

from Convair's Fort Worth plant – received its initial aircraft, soon at the rate of one a week. The operational work-up was long and hard. By 1949, B-36 training sorties were routinely lasting 24 hours and the longest B-36 flight of all, in January 1951, was of 51 hours. On 12 March 1949, a 7th BW B-36A made a 9,600 mile outand-back flight from Carswell without refuelling. Later, on 16 January 1951, six B-36s from Carswell landed at RAF Lakenheath to make the type's first appearance in England. They would later become a more familiar sight over the UK, thrashing their way at high altitude and seemingly taking an age to pass from horizon to horizon.

The type would go on to be built in several versions and to equip 10 USAF Wings. The B-36D was developed with four podded



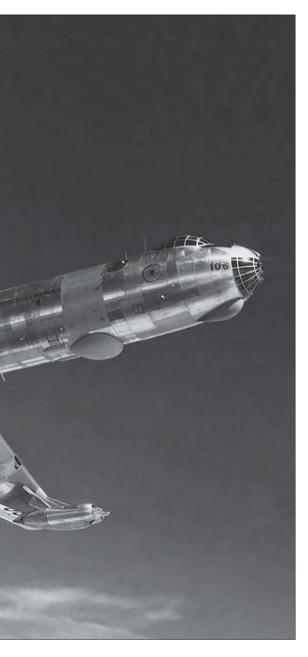












Above: 'Six turnin', four burnin'. This Convair RB-36D-5-CF, 49-2686, was a reconnaissance version of the mighty Peacemaker. In late 1952 during the Korean War, six 5th Strategic Reconnaissance Wing RB-36Ds were deployed to the 91st Strategic Reconnaissance Group at Yokota AB, Japan. This was the first introduction of the RB-36 to the Korean theatre. While not employed in any combat missions over North Korea, these RB-36s conducted high altitude aerial reconnaissance over Chinese Manchurian and Soviet east Asian targets.

Left: The B-36 was employed in a variety of aeronautical experiments throughout its service life. The FICON project involved a modified B-36 (called a GRB-36D 'mothership') and the RF-84K, a fighter modified for reconnaissance. The GRB-36D would ferry the RF-84K to the vicinity of the objective, whereupon the RF-84K would disconnect and begin its mission. Ten GRB-36Ds and 25 RF-84Ks were built and saw limited service in 1955–1956.



General Electric J47 turbojets, two per side, mounted under the wings. Thus equipped, the aircraft had better take-off performance (and increased warload) as well as higher speed over the target area. The RB-36D was a dedicated reconnaissance version of the B-36D, with the bomb bays given over to cameras, photo flashes, extra fuel and a new pressurised crew compartment. The final production variant was the B-36J, 33 examples of which were built with the last coming off the production line on 14 August 1954. These were characterised by white-painted 'anti flash' undersurfaces, this feature underlining the aircraft's nuclear role.

Even with its new complement of 10 engines, the B-36 was a lumbering beast that became increasingly vulnerable to the latest generation of Soviet fighter aircraft. To give the type a few more years of relative invulnerability, a number of B-36Ds were modified to 'featherweight' configuration by removing much of the defensive armament. These aircraft are said to have been capable of cruising at 50,000ft.

In its time, the B-36 was a fearsome weapon, which surely did much to check Soviet thoughts of territorial expansion during the Cold War. The B-36's four large bomb bays, which were sized to carry the largest (43,000lb) conventional bombs, also ensured the aircraft were capable of carrying internally any of the early US atomic weapons. The Mk 7 atomic bomb was over 15ft in length and the later Mk 17 hydrogen bomb – ironically nicknamed the 'runt' – over 24ft.

Project Gem was initiated in 1947 to modify the B-36 for atomic weapons carriage as the US nuclear stockpile was built up. It was its versatility that made the B-36 such Above: Cockpit details of the B-36, complete with six throttle levers. Beginning with the B-36D, Convair added a pair of General Electric J47-19 jet engines suspended near the end of each wing. Consequently, the B-36 was configured to have 10 powerplants, six radial propeller engines and four jet engines.

Convair B-36J Peacemaker

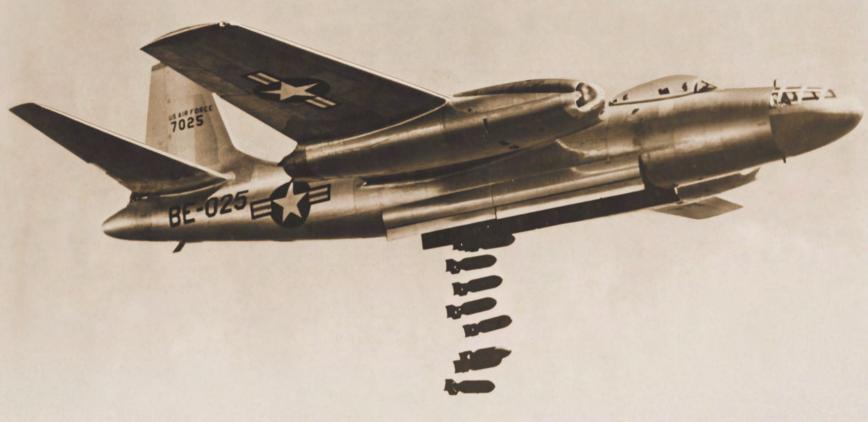
Crew: 13 Length: 162ft 1in (49.4m) Wingspan: 230ft (70.1m) Height: 46ft 9in (14.2) Weight empty: 166,165lb (75,370kg) Max. T/O weight: 410,000lb (186,000kg) Max Speed: 411mph (660km/h) Range: 10,000 miles (16,100km) **Powerplant:** 6 x Pratt & Whitney R-4360 radials, 4 x General Electric J47 turbojets **Armament:** (defensive) 2 x 20mm cannon in tail (offensive) a variety of A-bombs and H-bombs,

a valuable part of the SAC arsenal. Boeing's B-52 was, though, only a few years behind and offered a vastly improved, all-jet level of performance. B-36 operations were wound down progressively from 1956, and the final example was retired early in 1959. Just 385 had been manufactured, but the type was hugely important in the development of SAC's deterrent posture.

72,000lb

conventional bombs to

★ North American B-45 Tornado



eserving its place in any review of Cold War bombers, the B-45 Tornado also justifies its mention as America's first jet bomber. Designed in 1944 by the team of North American's 'Dutch' Kindelberger, the XB-45 was a straightwing, four-jet design with classic tricycle undercarriage. The pilot and co-pilot sat under a fighter-style cockpit canopy, while the bombardier was seated in the nose and the tail gunner in his own isolated position in the rear fuselage.

First flight of prototype 45-59479 was on 17 March 1947 at Muroc (now Edwards AFB). Two further prototypes flew soon afterwards, but the flight test programme did not always go to plan. 45-59479 was written off in a crash landing following a landing gear malfunction, partial flap failure and the loss of number 4 engine. Test pilot Albert Boyd might well have reflected that this was not his day, although the crew did emerge from the aircraft unscathed.

With more advanced, swept-wing bomber designs coming along, North American had to fight for production orders for the B-45. The

fitting of the GE J47 turbojet to later production B-45As (from 47-024) made the type viable enough to be issued to front-line units, and the 47th Bomb Wing was selected for re-equipment. Many of the 96 B-45A produced (47-001 to 47-096) served with the 47th, which moved across the Atlantic to install itself at Sculthorpe, Norfolk, in June 1952. With the B-45's limited range, the aircraft was assigned a tactical role, to employ atomic weapons against enemy airfields, troops, vehicles and communications and to slow any Soviet attack. Training missions continued unabated in the work-up to the unit's operational declaration. Inert, cement-filled 'shapes' were loaded in to B-45 bomb bays and released over the North Sea to simulate live weapons releases. The Mark 5 might have been a smaller, tactical atom bomb but it still measured 11ft in length and weighed upwards of a ton. Aircrew recalled that, immediately after weapon release, the aircraft suddenly gained 2,000ft. While the 47th BW's nuclear mission was officially secret, B-45As were sent to a number of RAF airfields for the 'At Home' days in September 1953 to show the flag.

From January 1958, re-equipment of the 47th BW with the Douglas B-66 got under way and the B-45A was fully retired later that year. Not all B-45s were bombers; further examples were built as - or converted to - RB-45C reconnaissance aircraft. These aircraft operated with SAC and TAC (Tactical Air Command) units in the States, in Europe and in Japan. A small number were also very temporarily 'transferred' to the RAF, such that they could take part in a number of highly secret 'Ju Jitsu' reconnaissance overflights of the Soviet Union from April 1952. These were undoubtedly high-risk missions. The aircraft wore RAF markings and were flown by RAF crews. Had an RB-45C been brought down over the Soviet Union, the USAF could have claimed that 'it isn't one of ours', while the RAF could equally have protested that it was demonstrably not an operator of this type. However impeccable the logic of this argument, the fact remains that the successful interception of an RB-45C on one of these missions would have had very serious political repercussions. Fortunately, it never happened.

Left: The XB-45 prototype of the Tornado releases its payload of bombs during early trials. Over 130 test flights were flown by the three prototype aircraft.

Right: A North American B-45C Tornado, 48-001. The type played an important part of the nation's nuclear deterrent in the early 1950s, but was quickly superseded by the Boeing B-47.

Bottom: A B-45A of the 47th BW at RAF Sculthorpe in February 1955. Nuclear-capable B-45s began reaching the UK in May 1952, and deployment of the 40 aircraft was completed by mid-June.





Left: Apart from being the first operational jet bomber flown by the USAF, the North American B-45 Tornado was also the first multi-jet engined bomber in the world to be refuelled in mid-air. Taken in June 1951, the official caption for this photograph reads: 'This is how the fast RB-45C appears during in-flight refueling (sic) from the blister of the KB-29 tanker.'

North American B-45A Tornado

Crew:

75ft 4in (22.96m)

Length: Wingspan:

89ft 0in (27.14m)

Height:

25ft 2in (7.67m) 45,694lb (20,726kg)

Weight empty:

Max. T/O weight: 110,000lb (49,900kg)

Max Speed:

570mph (920km/h)

Range:

1,000 miles (1,610km)

Powerplant:

4 x General Electric

J47-GE-13 turbojets





Ihe Boeing B-50 was a development of the company's earlier B-29 and was originally designated B-29D. Appearances can be deceptive, though, and the B-50 was in fact a significantly new design with only a 25% commonality with the earlier aircraft.

New 28-cylinder, four-row Pratt & Whitney R-4360 engines gave 60% more power than the B-29's R-3350s, the airframe structure was constructed of a new, lighter aluminium, while a more obvious external distinguishing feature was the taller fin and rudder. The B-50 was born into a political and military climate where the war had just ended, literally thousands of B-29s (and many other types) were being scrapped or put out to grass and the defence budget was being reeled back from its record wartime level. It is in this context that the re-designation from B-29D to B-50A should be seen, this allowing the manufacturer to present it as an 'all new' aircraft. One attraction it did have to the nascent SAC was that it was a purposebuilt atomic bomber, intended to be capable 'as it came off the production line' of delivering any weapon in the US nuclear arsenal. In fact,

the almost manic security imposed by the US Atomic Energy Commission with regard to sharing information on any aspect of the US nuclear programme made Boeing's task of ensuring this compatibility all the more difficult.

There was no prototype B-50 as such, with all the type's new features already having been trialled and tested on a number of B-29s. Thus the first B-50A (46-2) off the Seattle line was a true production aircraft, which flew on 25 June 1947. 370 further B-50s of all marks would follow, with production extending into 1953. The B-50B and B-50D were improved variants



Above: A fine study of Boeing B-50D 48-096 as it cruises along the Pacific West coastline. This aircraft was later converted to become the mothership for the Bell X-2 rocket planes.

with higher gross weight. The continuing development of atomic weapons in the US arsenal required the B-50 - now the spearhead of the USAF nuclear-capable bomber force – to receive the necessary modifications to remain compatible. These were implemented under the on-going Saddletree programme, the changes affecting the bomb racks, electrical connections and bomb bay heating.

Five USAF Bomb Wings flew the B-50 in the nuclear role, the first being the 43rd BW at Davis-Monthan AFB, AZ, which took delivery from June 1948. The B-50 was essentially a stop-gap measure until the B-47 became available but, in the event, continued in the role until late 1955. Many B-50s were converted to flight refuelling tankers as KB-50J and KB-50K by Hayes Industries. Fitted with a three-hose hose and drogue system, these tanker KB-50s were primarily used to refuel the jet fighters of Tactical Air Command. SAC was, by this time, totally committed to the flying boom system.

Max Speed: 394mph (634km/h)

Range: 2,394 miles (3,853km)

4 x Pratt & Whitney **Powerplant:**

Armament:

R-4360-35 28 fourrow air-cooled radial

piston engine, 3,500hp

(2,600kW) each (offensive) 20,000lb

(9,100kg) internally,

8,000lb (3,600kg)

externally.

(defensive): 13 x .50in

(12.7mm) M2 Browning

machine guns









Boeing B-47E Stratojet

Crew:

 Length:
 107ft 1in (32.6m)

 Wingspan:
 116ft (35.4m)

 Height:
 28ft (8.5m)

 Weight empty:
 78,600lb (35,650kg)

 Max. T/O weight:
 200,000lb (90,700kg)

 Max Speed:
 600mph (965km/h)

 Range:
 4,700 miles (7,600km)

 Powerplant:
 6 x General Electric J47

rated at 7,000lb

Armament: (defensive) 2 x 20mm

cannon in rear fuselage. (offensive) A wide variety of US free-fall nuclear weapons ('special weapons')

Above: The XB-47 prototype was rolled out on 12 September 1947 and made its maiden flight on 17 December piloted by test pilots Robert Robbins and Scott Osler. Sadly, during an early high speed test flight the canopy flew off killing pilot Scott Osler. The co-pilot was uninjured and was able to recover the aircraft back to base.

Boeing received a contract to construct two prototypes as the XB-47. The first of these was completed in record time and made its first flight on 17 December 1947. Eager to enter the jet bomber age, SAC placed an initial production order for the B-47A and the first aircraft was handed over to the 306th Bomb Wing on 23 October 1952. This unit, at MacDill AFB, FL, had a primary training role but further Wings followed, the second being the 305th BW that was also based at MacDill.

The pace of Boeing's B-47 deliveries allowed further Wings to re-equip through the early and mid-1950s, the production total eventually reaching over 2,000. The J47- powered B-47A was essentially a service test variant and was quickly succeeded in production by the B-47B, of which almost 400 were built. The B-47E, with uprated J47s and increased all-up weight, was the main production variant with over 1,500 built by Boeing, Lockheed and Douglas.

The B-47 rapidly achieved a reputation as a demanding aircraft to fly. It was generally agreed to have been under-powered, and to make possible maximum-weight take-offs

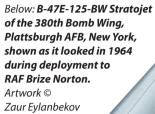
Right: Radical, sleek and fast, the B-47 had a fighter-like light touch to the controls, an impression enhanced by the large bubble canopy. In fact the aircraft was so clean aerodynamically that in a rapid descent into the landing pattern, the rear landing gear had to be deployed to act as an airbrake to slow it down. On landing a drag chute was deployed.





UNITED STATES AIR FORCE

Left: The B-47's reliability and serviceability were regarded as good, but it was always useful to get a second opinion when inspecting its General Electric J47 engines. The first production batch was fitted with J47-GE-11 turbojets, and these were gradually upgraded to the J47-GE-25A of the definitive 'E' model.



399

0-32399



Above: At the end of a long sortie, a Stratojet crew relax with a cigarette. Presumably the aircraft was not being refuelled at the time. Flying the Stratojet was a challenge. It was sluggish on take-off and fast on landing. If the pilot landed at the wrong angle, the B-47 would 'porpoise', bouncing fore-and-aft. If the pilot did not lift off for another go-around, instability would quickly cause the bomber to skid onto one wing and cartwheel. However, improved training led to a good safety record.







Top: The honour of being the 1,000th Stratojet produced by Boeing fell to B-47E 52-609. The B-47 formed the backbone of SAC into 1959, when the B-52 began to assume nuclear alert duties. B-47 production ceased in 1957.

Above: The three man Stratojet B-47E crew consisted of the aircraft commander, co-pilot, and a navigator/bombardier, the latter seen here using the K bombing system.

Left: The awesome and rather frightening sight of 13 Stratojets powering overhead, leaving heavy smoke trails in their wake.

from airfields at high altitudes or in high ambient temperatures racks of JATO bottles could be fitted to the rear fuselage to boost take-off performance. So streamlined was the design that a ribbon-type brake parachute was employed to slow the aircraft for landing, the pilot streaming it on – or sometimes even before – touchdown. The aircraft's range was nowhere near that of the B-36 that preceded it or the B-52 that followed. Fortunately, SAC was, at the time, building up its fleet of KC-97 flight refuelling tankers and the B-47 had a suitable



Below and bottom: Always a sight and sound to behold, a Stratojet blasts off from terra firma aided by JATO bottles to provide added power permitting heavier payloads, increased range, shorter take-off runs, or a combination of these.

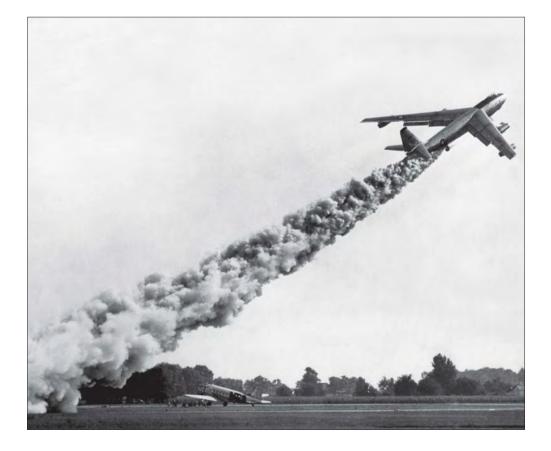


receptacle for the Boeing-designed boom in the forward fuselage. At high altitude, the B-47 pilot could find himself in 'coffin corner'. This occurred at the point in the flight envelope where low-speed stall and high-speed buffet came together. Pull back on the control column and the aircraft would start to stall, push forward and it would encounter high-speed buffet. Getting out of such a situation required careful handling by the pilot.

With the B-47's limited range, overseas deployments became more regular. 'Reflex Action' deployments of three-week duration brought SAC B-47s to bases in the UK, Spain and North Africa, where they held a permanent alert, ready to launch towards targets in the Soviet Union at 15 minutes' notice. In the UK, the airfields concerned included Brize Norton, Upper Heyford, Greenham Common and Fairford, where Reflex activity continued until early 1965.

Early in its service career the B-47 operated primarily at high altitude, but improved Soviet radars and defences forced a rethink in the late 1950s to train in low-level flying and weapons delivery involving the Low Altitude Bombing System (LABS) manoeuvre. With this method, the aircraft ran in at low level before pulling up steeply into a half loop, 'tossing' the nuclear weapon towards the target in the climb before rolling out and heading for home. Provided, of course, there was still a home to head for.

Numerically speaking, the B-47 was the most important bomber type in the SAC inventory. Withdrawal started as early as 1959, but it was not until end-December 1967 that the last SAC B-47 was retired. Most were flown to the boneyard at Davis-Monthan AFB, AZ, where they were reduced to produce.





⇔ Boeing B-52 Stratofortress

espite the first aircraft having flown 64 years ago (first flight of the YB-52 49-231 was 15 April 1952) and the fact that the production line closed down after the last aircraft (B-52H 61-040) was delivered in October 1962, the Boeing B-52 remains today very much in service with the USAF.

Of the 744 examples delivered, around 80 are still in front-line use with Bomb Wings at Barksdale, LA, and Minot, ND, while the projected current out-of-service date (OSD) has been pushed back to 2040. With the type already qualifying for its 'long service' award, today's B-52H looks externally very much like the YB-52 of 1952, save the fact that the current aircraft has eight P&W TF33 turbofans which give more power, better economy and, most noticeably, far less smoke than the earlier J57 turbojets.

In broad outline, the B-52 shares many design features with the company's B-47. Both have

swept wings, podded under-wing engines and a tandem undercarriage arrangement ('quadricycle' in the case of the B-52) that requires the pilot to perform 'flat' take-offs without the ability to rotate. Early model B-52s had the tall fin and rudder, but on the final B-52G and H models the fin height was considerably reduced.

Designed as a nuclear bomber, the B-52 today retains that capability but has developed into a highly capable carrier of all kinds of weapons. The B-52G was the sixth major production variant; the B-52A was only used on flight test duties. This variant had a beefed-up structure, a significant increase in fuel capacity and, most importantly, was the first to have a stand-off weapons capability. Two GAM-77 (later AGM-28) Hound Dog supersonic missiles could be carried, one under each wing. The first production Hound Dog (named, incredibly, after the song covered by Elvis Presley) was

handed over to Gen Thomas Power, C-in-C of SAC, on 21 December 1959. The missile's range of some 700 miles and its ability to fly a variety of attack profiles gave the B-52 a far better chance of attacking heavily defended targets.

The B-52H, the final production variant and the only one still in service, was similar to the B-52G but was fitted with TF33 turbofans offering 17,000lb of thrust each. Even without in-flight refuelling, the B-52H could go a long way. This was demonstrated, to the Féderation Aéronautique Internationale as a record and to the Soviet Union as a salutary reminder, by the 12,532-mile unrefuelled flight of B-52H 60-0040 from Kadena, Okinawa to Torrejon, Spain on 10 December 1962.

SAC (motto 'Peace is our profession') came into being on 21 March 1946 with the mission of creating and maintaining a nuclear strike force able to operate in all conditions and to provide nuclear deterrence against the



emerging Soviet threat. It would go on to control two of the three elements in the US nuclear 'triad' – manned bombers and ICBMs.

B-52s were the cornerstone of this deterrence, with fully-armed aircraft being put on ground alert, ready to launch within 15 minutes and backed up by KC-97 tankers, from 1 October 1957. The aim was to have a third of SAC's bombers on ground alert at all times. The 15 minutes allowed was determined by the amount of warning of attack that planners expected to have before Soviet missiles started impacting defence installations in the continental US.

This readiness was extended to having nuclear-armed B-52s in the air on a constant airborne alert from early 1961. Operation 'Chrome Dome' involved a number of aircraft taking off from their home bases and taking either the Western route over Alaska, the Northern route over Canada and Greenland or the Southern route over the Atlantic, over Spain

Above: The giant Boeing B-52 Stratofortress is the longest-serving warplane in the history of aviation, still in action over 60 years after its first flight. The B-52's official name Stratofortress is rarely used; informally, the aircraft has become commonly referred to as the BUFF (Big Ugly Fat Fella [polite version]).

and into the Mediterranean. The aircraft were fully armed and ready to attack their assigned targets on receipt of the correct, authenticated orders. Apart from that, it was a case of flying long missions lasting 24 hours or more on vast orbits. One 'Chrome Dome' sortie on the Southern route gave rise to the USAF's worst nuclear accident when, on 17 January 1966, a B-52G from Seymour Johnson AFB, NC, collided with a KC-135 tanker while refuelling off the coast of Spain. Four B28 hydrogen bombs were released and both aircraft were destroyed. The result was a vast search and a costly clean-up operation.

The ground nuclear alert held by SAC B-52s was stood down in September 1991 in the new spirit of détente. Subsequently, around 350 early model (pre-B-52H) aircraft, which had been in store at Davis-Monthan AFB or recently retired in the case of the B-52G fleet, were most visibly broken up in the early 1990s under the terms of the Strategic Arms Limitation Treaty (SALT).

ECM on the B-52 has improved greatly over the years, while other stand-off weapons such as AGM-69 SRAM (Short Range Attack Missile) and AGM-86 ALCM (Air Launched Cruise Missile) have been introduced to allow the B-52 to attack targets in a high-threat environment. The Douglas GAM-87 Skybolt air-launched ballistic missile (see section on the Avro Vulcan) was designed for the B-52 and would have offered a stand-off range of over 1,000 miles. Test launches from a B-52 began in April 1962 but went badly and the whole programme was cancelled in November of that year.









Above: The XB-52 prototype featured the original tandem seating arrangement with a framed bubble canopy. Here the aircraft is seen taking off from Boeing Field, Seattle, in its typically nose-down attitude.

Left: The Boeing B-52 assembly line, highlighting the immense wingspan of the Stratofortress. Early production of the B-52 was shared between Boeing's Seattle and Wichita plants, but in 1957 it was decided to transfer all production to Wichita. Production ended in 1962 with 742 aircraft built, plus the original two prototypes.

Right: 'Ain't nothin' but a hound dog'. A B-52 looks menacing with a pair of GAM-77 Hound Dog stand-off nuclear missiles slung under its wings. Remarkably the missile was named after the song made famous by Elvis Presley.

Bottom right: B-52H 60-0021 of the 19th Bombardment Wing (BW), based at Wurtsmith AFB, Michigan, during the Cuban Missile Crisis of October 1962. The aircraft is armed with a pair of GAM-77 Hound Dog missiles.





Above: Rare beast. Only three of the 13 B-52As ordered were built and all were used by Boeing in its test programme. The remaining 10 were upgraded and delivered as B-52Bs, becoming the first examples to enter active service.

Left: B-52 crews sprint to their aircraft during a 'Scramble' drill, to hone their readiness on alert. Note the anti-flash white underside of the fuselage.

Below: Using typical Cold War propaganda, the original caption to this image reads... 'The eight-jet Boeing B-52, a huge hydrogen-bomb carrier, described as the most formidable aircraft in the striking force of the United States Strategic Air Command, is ready to replace the obsolescent B-36s of the 42nd Heavy Bomber Wing at Loring AFB in Maine, and by 1958 some 500 of the monster aircraft will be in service to discourage any possible enemy attacks or to retaliate if any should come.' The actual image shows Boeing B-52s on the pre-delivery flight line at Boeing's Seattle plant.



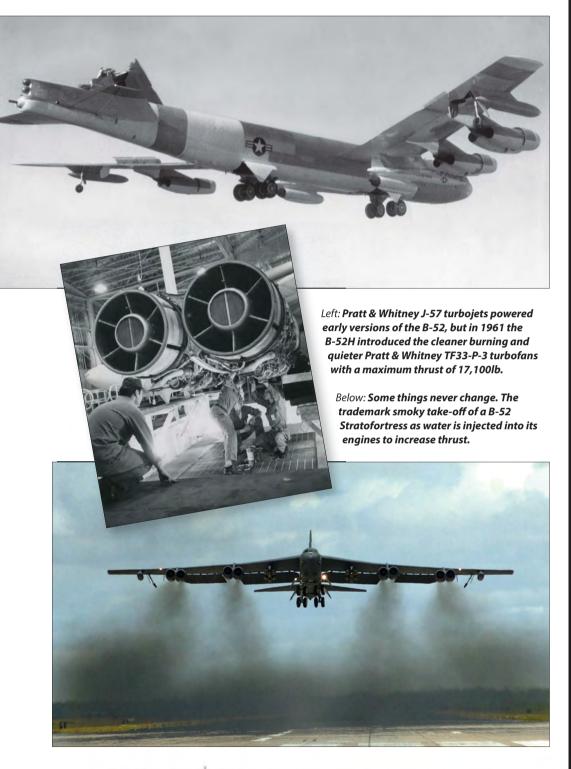
Boeing B-52H Stratofortress

5 Crew: Length: 159ft 4 (48.6m) Wingspan: 185ft (56.4m) Height: 40ft 8in (12.4m) Weight empty: 166,000lb (75,300kg) Max. T/O weight: 488,000lb (221,350kg) **Max Speed:** 630mph (1,010km/h) 8,800 miles (14,200km) Range: 8 x Pratt & Whitney TF33 **Powerplant:** turbofans rated at 17,000lb **Armament:** (defensive) 1 x M61 rotary cannon in rear fuselage. (offensive) 4 x GAM-87 Skybolt ballistic missiles. 2 x AGM-28 Hound Dog cruise missiles, up to 70,000lb of ordnance





Below: An amazing photograph that demonstrates the strength of the B-52. On 10 January 1964 a Boeing test crew were flying over a mountainous stretch of Colorado when their B-52H was hit by turbulence. Pilot Chuck Fisher climbed to 14,300ft in hope of smoother air, but the aircraft was struck by turbulence so strong that it sheared off the aircraft's vertical tail fin. Fisher told the crew to prepare to abandon ship. He descended to 5,000ft where they would bail out, but the B-52 continued to fly without significant impediment. Fisher landed it in one piece – minus the tail – at Blytheville AFB in Arkansas. Not surprisingly he said 'The B-52 is the finest airplane I ever flew'.









Below: B-52G 57-6516 of the 63rd Bombardment Squadron (Provisional)/72nd BW (Provisional), Andersen AFB, Guam, 1972.

VIETNAM VET

The B-52's first combat mission, Operation 'Arc Light', was flown by B-52Fs on 18 June 1965, when 30 bombers of the 9th and 441st BS struck a communist stronghold in South Vietnam. It was an inauspicious start as two B-52s collided, which resulted in the loss of both bombers and eight crewmen. The bomber went on to play a crucial but sometimes controversial role in the conflict, which ended with Operation 'Linebacker II', the 'Eleven-Day War' of 18-29 December 1972. In that effort against military and industrial targets in the Hanoi-Haiphong area of North Vietnam, B-52D and B-52G models flew 729 sorties against 24 target complexes delivering 300,000lb of bombs. After years without a loss, 15 B-52s were shot down by Soviet-supplied SA-2 'Guideline' surface-to-air missiles. The 'eleven days of Christmas' is credited by many with bringing North Vietnam to the negotiating table and ending the war on 27 January 1973.







Convair B-58 Hustler

n the late 1940s, the USAF knew it would eventually need a new bomber type to replace the B-47, even though that aircraft had yet to enter service. It liked the idea of a jet-powered supersonic design and Mach 2 capability was deemed desirable. Several US manufacturers responded with proposals but the delta-winged MX-1626 (which later became the MX-1964) design from Convair was selected in December 1952.

The proposed aircraft was small for a bomber but, Convair argued, the one nuclear weapon that it would be capable of delivering carried as much destructive power as all the bombs dropped by the USAAF 8th Air Force during World War 2.

Delta-winged and with four podded, under-wing GE J79 turbojets, the type would be designated B-58A Hustler in USAF service. Just three crew - pilot, navigator/bombardier and defensive systems operator - were needed. Only the pilot had any real view on the outside world, but all three had individual escape capsules to give a good chance of surviving ejection at Mach 2 or at 70,000ft. Unlike most every bomber up to that time, the B-58 had no bomb bay. Rather, a 57ft-long, streamlined, finned pod was carried under the central fuselage. The MB-1C pod, the initial version, contained fuel tanks front and rear, an equipment bay and a large thermonuclear weapon. The fuel was used by the aircraft in

getting to its target; the pod with the bomb could then be released to make its free-fall descent to its objective, the fins imparting a slow spin as it descended. The later TCP (two-component pod) had two separate sections. The lower part of the pod was a pure fuel tank and could be jettisoned en route once empty, while the upper component housed further fuel and a Mark 53 nuclear weapon which could remain on the under-fuselage pylon until over the target.

The B-58A entered USAF service from August 1960, when the first examples were delivered to the 43rd Bomb Wing at Carswell, TX. This unit would later move to Little Rock AFB, AK, while a second Wing was formed



when the 305th BW at Bunker Hill AFB. IN. received its first aircraft in May 1961. Both Wings had transitioned from the B-47. Soon after the B-58 entered service, the type started setting speed records to underline the fact that the USAF had its first supersonic bomber. In Operation 'Heat Rise', a 43rd BW aircraft flew from Los Angeles to New York and return in 4hrs 41min, averaging 1,045mph. The B-58 was normally speed-limited to keep the external airframe temperature to 115°C to ensure the structural integrity of the aluminium honeycomb panels used in its construction, but for this record attempt Convair engineers agreed an increase to 125°, to allow speeds of up to 1,400mph. Skin temperature sensors were installed to ensure temperatures kept

Below: Appropriately named the Hustler, the highly aerodynamic Convair B-58 was the first operational bomber capable of Mach 2 flight.

within these limits, and this was the explanation behind the project name 'Heat Rise'. This two-way trans-continental dash set a number of records and saw the crew receive several awards including the Bendix and Mackay Trophies. The USAF subsequently received over 10,000 complaints and demands for compensation for damage from people under the flight path. Evidently the SAC PR machine still had some way to go to persuade the entire US population that the sonic boom was indeed 'the sound of freedom'.

The Hustler was never easy to fly and crews were hand-picked from the USAF community. High speeds and high angles of attack were required for both take-off and landing, maintaining a safe centre of gravity during acceleration or deceleration was challenging and the loss of an engine in supersonic flight could pose serious problems. Alongside the record flights, B-58s were involved in a number

of crashes. Perhaps the most public were two losses of aircraft having made the trans-Atlantic flight to attend the Paris air show at le Bourget. In 1961, 59-2451 'The Firefly' crashed performing low-altitude aerobatic manoeuvres, while four years later 59-2443 'Bye Bye Birdie' undershot when landing.

Although originally seen as a replacement for the B-47, in the event the B-58 only ever equipped two Bomb Wings and just 116 examples were produced. By 1970, after only 10 years, the B-58 fleet had been quietly retired and the remaining aircraft flown to the desert boneyard at Davis-Monthan AFB. This decision was taken primarily on financial grounds. The B-58 was expensive to maintain and to operate and, with just two Wings equipped, was but a minor type in the USAF's inventory. SAC protested and argued for an extension to 1974, when the FB-111A would be established in service, but to no avail.









Convair B-58A Hustler

Crew: 3

 Length:
 96ft 9in (29.5m)

 Wingspan:
 56ft 10in (17.3m)

 Height:
 29ft 11in (9.1m)

 Weight empty:
 55,560lb (25,200kg)

without MB-1 pod

Max. T/O weight: 176,900lb (80,240kg)

Max Speed: Mach 2 - 1,320 mph (2,120km/h) at altitude

Range: 4,400 miles (7,080km)

Powerplant: 4 x General Electric J79

turbojets rated at 9,700lb dry and 15,600lb

in afterburner

Armament: (defensive) M61 rotary

cannon in rear fuselage. (offensive) Underfuselage MB-1 or TCP pod with Mark 39 or Mark 53 nuclear weapon



Left: The Convair B-58 production line. Well shown are the three self-contained crew compartments in tandem arrangement.

Below left: Convair testing a novel ejection capsule that made it possible to eject at an altitude of 70,000ft (21,000m) at speeds up to Mach 2 (1,320mph). A protective clamshell would enclose the seat and the control stick, allowing the pilot to continue to fly even 'turtled up' and ready for immediate egress. In an unusual test programme, live bears and chimpanzees were successfully used to test the ejection system!

Above right: Instead of an internal bomb bay, the Hustler carried its payload in a large streamlined external pod, which gave the aircraft an even more aggressive appearance.

Right: The sleek lines and delta wing of the Convair B-58 prototype. Serial number 55-660, was completed in late August 1956 and took to the air three months later.

Below: A rare colour image of the second Convair B-58 prototype, 55-0661. A difficult and protracted flight test programme involving 30 aircraft continued until April 1959.







it went from Tokyo to London (via Alaska), a distance of 8,028 miles (12,920km) in 8hrs 35min, averaging 938mph (1,510km/h).

Right: Convair B-58A-30-CF Hustler 61-2053, 305th Bomb Wing, Bunker Hill AFB, IN, late 1960s. Artwork © Zaur Eylanbekov









he F-111 programme was instigated in the early 1960s when the US Secretary of Defense directed the US Navy and the USAF to adopt a single aircraft design to meet their widely differing needs under the TFX programme.

The aircraft featured variable geometry ('swing wings'), afterburning turbofan engines and terrain-following radar for low-altitude, terrain-hugging approach to the target.

Suffice to say that the F-111's development programme encountered numerous problems, that the US Navy pulled out as its version was clearly unsuited to the requirement for a carrier-based interceptor, and that the aircraft was late in coming into service with the USAF.

Although nuclear-capable, the original F-111 was essentially a tactical aircraft. As such, it served with Tactical Air Command units in its F-111A/D/E/F versions from summer 1967. In a later development and as an interim measure to replace the B-58A Hustler, the FB-111A was

ordered in 1966. With longer wings (from the cancelled US Navy F-111B), a lengthened fuselage and increased fuel tankage, the FB-111A achieved what can just be considered strategic range - around 3,300 miles with high altitude cruise. The FB-111A could carry nuclear armament and in particular the AGM-69 SRAM

General Dynamics FB-11A

Crew:

Powerplant:

Length: 75ft 6in (23.01m)

Wingspan: 70ft 0in (21.33m),

34ft (10.36m) fully swept

 Height:
 17ft 0in (5.18m)

 Max. T/O weight:
 114,000lb (51,709kg)

Max Speed: Mach 2 – 1,320 mph

(2,120km/h) at altitude **Range:** 3,350 miles (5,391km)

> 2 x Pratt & Whitney TF30-P-7 turbofan

engines

Armament: Boeing – AGM-69A SRAM with W6 warhead

nuclear stand-off weapon, mounting two internally and four on under-wing pylons.

The FB-111A served with two SAC Wings – the 509th at Pease AFB, NH and the 380th at Plattsburg AFB, NY – from 1971. Although plans were initially for 200+ FB-111As, in the event only 76 were built, and the type – like the B-58 Hustler it replaced – never became a major player within SAC. All had been retired by 1991.

Left: Sun glints of the canopies of this pair of FB-111s with wings in the forward position.

☼ Rockwell B-1 Lancer

f we take the accepted end of the Cold War as 1991, the year the Soviet Union finally collapsed, the B-1 Lancer (often referred to as the 'Bone' (B-One)) only took its place in the USAF arsenal for the final five years of this period.

The original B-1A was developed by Rockwell as a strategic bomber capable of Mach 2 at altitude and Mach 0.85 at low level. Its design included a number of features then in vogue – swept wings to allow operation from shorter runways than those usable by the B-52 and an ejectable crew capsule (rather than individual ejector seats) to improve the crewmembers' chances of surviving an ejection at altitude.

Below: The prototype of the Rockwell B-1A
Lancer revealed a well-proportioned curvaceous
airframe that blended in to the variable-sweep
wings. Serialled 74-0158, it first flew on
23 December 1974.

Four prototypes were ordered, the first (74-0158) taking to the air on 23 December 1974.

For reasons both of programme cost and the B-1A's increasing vulnerability to a new generation of Soviet defences, the programme was cancelled in 1977 before a production decision was taken. The aircraft re-emerged, albeit in a slightly different form, in 1981 following Ronald Reagan's installation as US president, and a contract for 100 of the 'new' B-1B was announced in January 1982.

Numerous changes to the design were made to suit the B-1B for the low-level penetrator role now envisaged. The maximum speed requirement was lowered to Mach 1.25 and emphasis was put on reducing the radar cross-section and improving the avionics and ECM suite. Two B-1A prototypes were modified to include systems and equipment intended for the new variant, and the initial production B-1B

(82-0001, christened 'Leader of the Fleet') made its first flight on 18 October 1984. Progress from that point onwards was fast. Deliveries to the first operational unit, the 96th Bomb Wing, at Dyess AFB, TX, began in June 1985, Initial Operational Capability (IOC) was achieved on 1 October 1986 and the 100th and final aircraft was handed over on 2 May 1988.

While initially serving as a nuclear bomber, the B-1B was switched to a non-nuclear role in the mid-1990s. In the first six months of Operation 'Enduring Freedom' in 2001/2, eight B-1Bs dropped almost 40% of the total tonnage delivered by coalition forces. The type is today the true multi-role bomber in the USAF inventory, capable of delivering a wide variety of conventional munitions, both guided and unguided. Various modification and upgrade programmes are under way to extend the B-1B's service life towards 2040.





Above: The cockpit of an early B-1 was highly advanced for its time.

Right: The first Rockwell B-1 nearing completion and revealing the extensive use of aluminium and titanium in its construction.

Below: The sleek shape of the Rockwell B-1A with wings in fully-swept position. Unlike the B-1A, the B-1B cannot reach Mach 2+ speeds; its maximum speed is Mach 1.25 (about 950mph or 1,530km/h at altitude), but its low-level speed increased to Mach 0.92 (700mph, 1,130km/h).

Rockwell B-1B

Crew:

Length: 146ft (44.5m)

Wingspan: 136ft 8in at minimum

sweep (41.7m)

 Height:
 33ft 7 in (10.2m)

 Weight empty:
 190,000lb (86,200kg)

 Max. T/O weight:
 477,000lb (216,370kg)

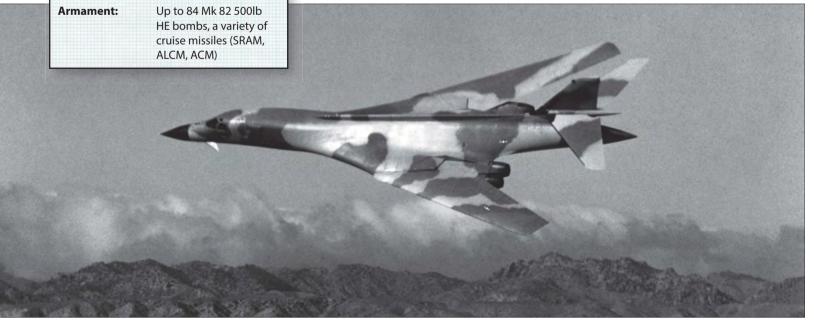
 Max Speed:
 820mph (1,320km/h)

 Range:
 7,400 miles (11,900km)

Powerplant: 4 x General Electric

F101 turbofans







The B-1B entered service in 1986 with the USAF Strategic Air Command (SAC) as a nuclear bomber. In the early 1990s, it was converted to conventional bombing use and first served in combat during Operation 'Desert Fox' in 1998 and again during the NATO action in Kosovo the following year. The B-1B has supported US and NATO military forces in Afghanistan and Iraq. The B-1B is expected to continue to serve into the 2030s and possibly beyond.



SUBSCRIBE

TO YOUR FAVOURITE MAGAZINE

AND SAVE



Aeroplane traces its lineage back to the weekly The Aeroplane launched in June 1911, and is still continuing to provide the best aviation coverage around. Aeroplane magazine is dedicated to offering the most in-depth and entertaining read on all historical aircraft.

www.aeroplanemonthly.com







SUBSCRIBE AND SAVE • SUBSCRIBE AND

GREAT SUBSCRIPTION OFFERS FROM





FREE UK AIR ARMS POSTER NORTH KOREAN **AIRSHOW EDINBURGH AIRPORT** COMPETITION

FlyPast is internationally regarded as the magazine for aviation history and heritage. Having pioneered coverage of this fascinating world of 'living history' since 1980, FlyPast still leads the field today. Subjects regularly profiled include British and American aircraft type histories, as well as those of squadrons and units from World War One to the Cold War.

www.flypast.com

As Britain's longest established monthly aviation journal, Aviation News is renowned for providing the best coverage of every branch of aviation. Each issue has the latest news and in-depth features, illustrated with the very best photography. Now incorporating JETS magazine, Aviation News brings you the best of both magazines.

www.aviation-news.co.uk

ALSO AVAILABLE DIGITALLY:















Available on PC, Mac, Blackberry and Windows 10 from pocketmags.com



FOR THE LATEST SUBSCRIPTION DEALS

www.keypublishing.com/shop

(UK) 01780 480404 (Overseas) +44 1780 480404



Please quote: XMAS16 Close Date: 28 February 2017

2 EASY WAYS TO PAY

Order online at www.keypublishing.com/shop





Call UK **01780 480404** Overseas +44 1780 480404 Lines open 9.00am - 5.30pm GMT